DRAFT

CORRECTIVE MEASURES IMPLEMENTATION WORK PLAN OPERABLE UNIT NO. 1 (OU1)

Omaha Shops

Prepared for
Union Pacific Railroad Company
Omaha, Nebraska

UNION PACIFIC

ENVIRONMENTAL MANAGEMENT

July 2000

URS
101 South 108th Avenue
Omaha, Nebraska 68154

CORRECTIVE MEASURES IMPLEMENTATION WORK PLAN
OPERABLE UNIT NO. 1

UNION PACIFIC RAILROAD
OMAHA SHOPS

Union Pacific Railroad Company
1416 Dodge Street
Omaha, Nebraska 68179

CERTIFICATION

"I certify that this document and all attachments hereto were prepared under my direction or supervision. To the best of my knowledge, information and belief, the information submitted is true, accurate and complete. I am aware that there are criminal penalties for knowingly providing false information."

Signature: Jeffrey D. McDermott

Name: Jeffrey D. McDermott

Title: Mgr. Environmental Site Remediation

Date: July 24, 2000

The RCRA Corrective Measures Implementation (CMI) Work Plan for Operable Unit 1 consists of the following documents:

- Work Plan
- Data Management Plan
- Construction Quality Assurance/Quality Control Plan
- Health and Safety Plan
- Data Collection Quality Assurance Plan
- Project Management Plan

Each of the above documents can be found in a separate section of this CMI Work Plan.

DRAFT

CMI WORK PLAN
OPERABLE UNIT NO. 1 (OU1)

Omaha Shops

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CFR	Code of Federal Regulations
CMS	Corrective Measures Study
CQA/QCP	Construction Quality Assurance/Quality Control Plan
DCQAP	Data Collection Quality Assurance Plan
DMP	Data Management Plan
HDR	HDR Engineering, Inc.
HSP	Health and Safety Plan
mg/kg	milligrams per kilogram (parts per million)
msl	Mean Sea Level
O&M	Operation and Maintenance
Order	Administrative Order on Consent
OSHA	Occupational Safety and Health Administration
OU1	Operable Unit No. 1
PMP	Project Management Plan
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SCS	Soil Conservation Service
TMV	Toxicity, Mobility, and Volume
UPRR	Union Pacific Railroad Company
URSGWC	URS Greiner Woodward Clyde
URS	URS Corporation
USEPA	U.S. Environmental Protection Agency
W-C	Woodward-Clyde Consultants

1.3 REPORT ORGANIZATION

The OU1 Work Plan is organized into the following sections:

Section 1 – Introduction and Purpose: Describes the UPRR Omaha Shops, purpose of the CMI Work Plan, and report Organization.

Section 2 – Facility Setting Summary: Contains the environmental setting at UPRR Omaha Shops, including climate, geology and hydrogeology.

Section 3 – Lead-Containing Soil Corrective Measure: Discusses the corrective measure as selected from the Final Corrective Measure Decision. The section details the design basis and criteria, performance expectations, implementation and operation requirements.

Section 4 – Special Considerations and Uncertainties: Discusses special design and implementation considerations and uncertainties.

Section 5 – Schedule and Costs: Presents the construction schedule and costs.

Section 6 – References.

1.1 UPRR OMAHA SHOPS LOCATION AND BACKGROUND INFORMATION

The Union Pacific Railroad (UPRR) Omaha Shops are located at 9th and Webster Streets in Omaha, Nebraska (North 41°15' 58" latitude, West 95° 55' 40" longitude). The legal description of the facility is Township 15 North, Range 13 East, Section 22. The Omaha Shops encompass approximately 184 acres located north of downtown Omaha, just west of the Missouri River in the Missouri River floodplain (Figure 1-1).

The Omaha Shops include various buildings and production support areas, each having a function in past operations of the facility. The Omaha Shops were in operation for approximately 100 years, with principal functions as a railroad fueling facility, repair shop, paint shop, and car body repair shop for UPRR's locomotive and car fleet.

UPRR used steam engines from the 1860s until the mid-1950s. The original steam engines were fueled by burning wood, coal, fuel oil, and petroleum-based fuel. In the mid-1950s, diesel power became the predominant source of power for train locomotives. During that time, the entire facility was converted from handling steam engines to diesel engines.

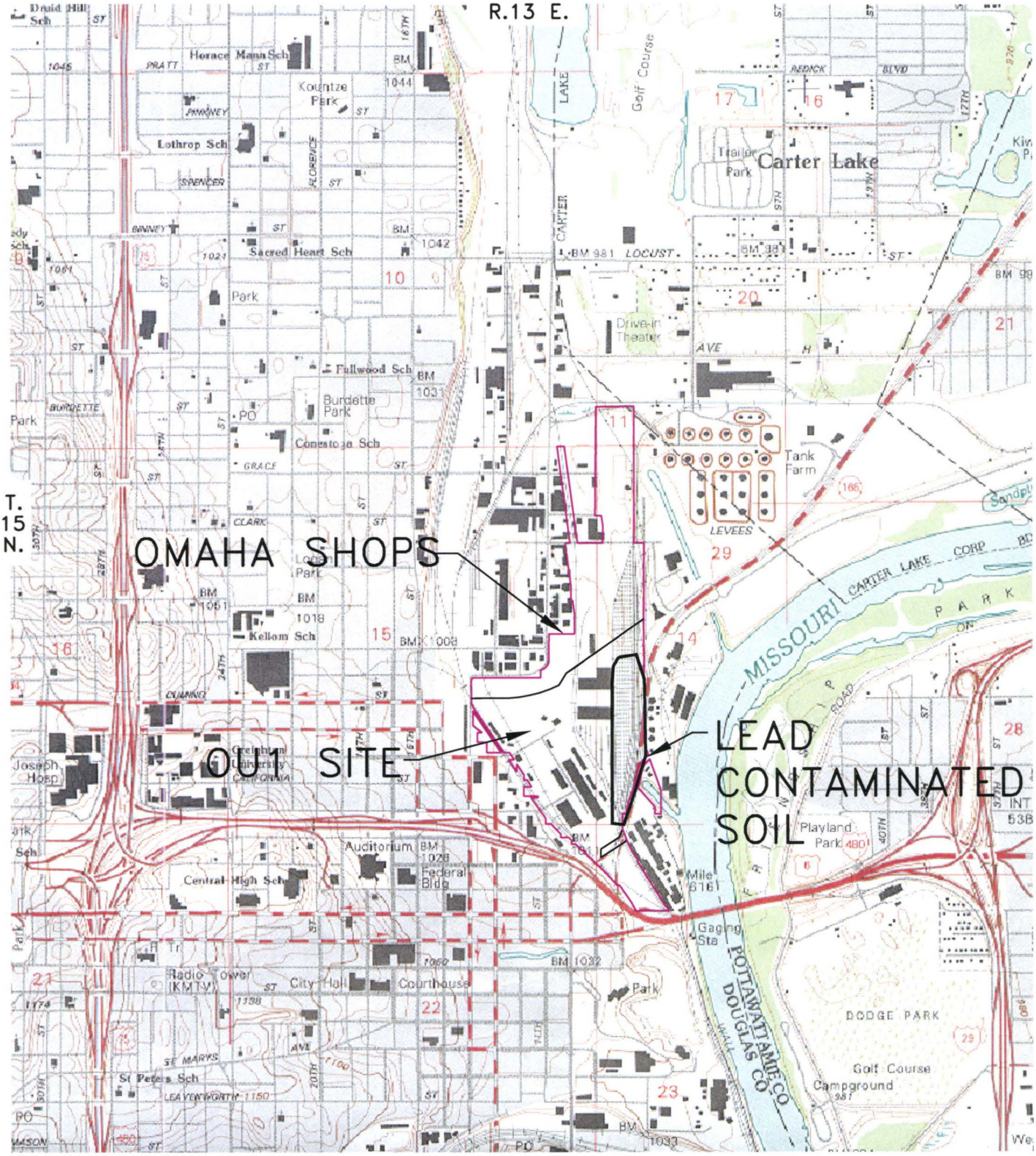
From the 1950s to 1988, the site was a major overhaul and maintenance facility for UPRR. In 1988, most of the operations, except the print shop and the car shop, moved to Little Rock, Arkansas. After the operations were moved in 1988, facility demolition began. Specific operations history for Operable Unit 1 (OU1) is presented in the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report (URSGWC 1999).

The Omaha Shops are the subject of a United States Environmental Protection Agency (USEPA) Administrative Order on Consent (Order) under Section 3008(h) of RCRA. The Order requires UPRR to complete a Corrective Measure at OU1. The OU1 site includes the surface soils above the normal high water table within the portion of the Omaha Shops that is proposed to be acquired by the City of Omaha for the development of a public-use building project (Figure 1-2).

1.2 PURPOSE

The purpose of this CMI Work Plan is to present information for the execution, operation, and monitoring of the corrective measure selected in the Final Corrective Measure Decision for OU1 (USEPA 2000). The corrective measure will be implemented and maintained until the corrective action objectives and the conditions of the Order for Termination and Satisfaction have been met. This Work Plan is part of the CMI planning documents and also includes the following:

- Project Management Plan (PMP)
- Data Management Plan (DMP)
- Construction Quality Assurance/Quality Control Plan (CQA/QCP)
- Health and Safety Plan (HSP)
- Data Collection Quality Assurance Plan (DCQAP)



NEBRASKA

QUADRANGLE LOCATION

BASE MAP SOURCE: USGS 7.5 MINUTE SERIES (TOPOGRAPHIC) QUADRANGLE MAP OF OMAHA NORTH, NE.–IA., 1994.

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OMAHA SHOPS LOCATION

OMAHA SHOPS
UNION PACIFIC RAILROAD COMPANY

URS Greiner Woodward Clyde

DRN BY DAP	DATE 12/15/99	PROJECT NO. 45-091MC204.02	FIG. NO. 1-1
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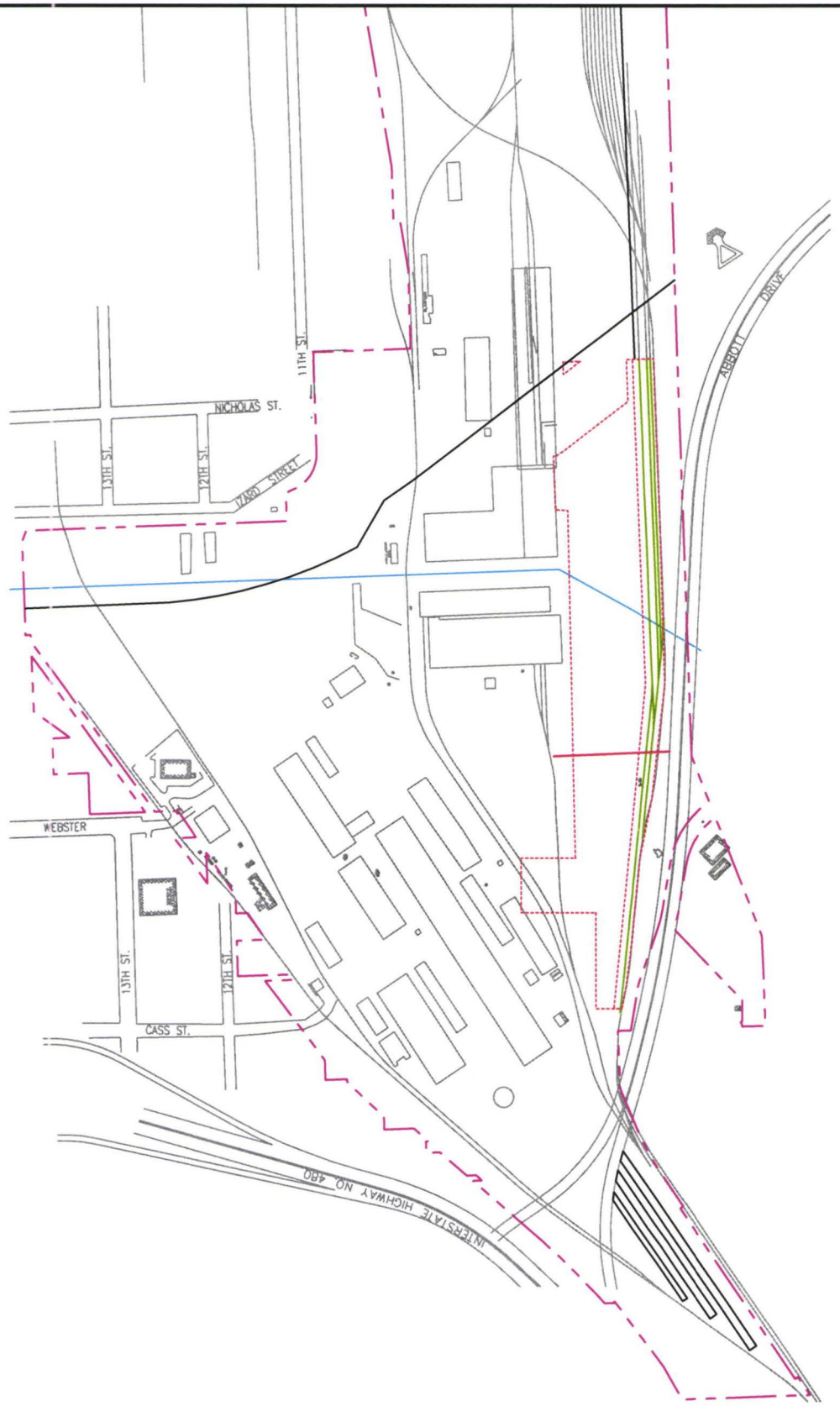

OU1 SITE PLAN

OMAHA SHOPS
UNION PACIFIC RAILROAD COMPANY

URS Greiner Woodward Clyde

DRN BY DAP	DATE 05-04-00	PROJECT NO. 45-091MC204.02	FIG. NO. 1-2
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2.1 ENVIRONMENTAL SETTING

2.1.1 Physiography and Topography

The Omaha Shops are located at 9th and Webster Streets in Omaha, Nebraska. The Omaha Shops encompass approximately 184 acres located just west of the Missouri River in an industrialized area of downtown Omaha. The area of OU1 is about 120 acres.

The topography of the Omaha Shops is typical of the Missouri River floodplain. The land surface is nearly level. Surface drainage is primarily to the east, toward the Missouri River.

Surface elevation of the site is approximately 985 feet above mean sea level (msl). The Omaha Shops are about 10 to 15 feet above normal river stage.

2.1.2 Soil Type

Only one surface soil type is present at the Omaha Shops (cut and fill land). Cut and fill land (0 to 30 percent slopes) consists of areas that have been leveled or reshaped for industrial tracts. The original soils have been changed to the extent that they are no longer recognizable (Soil Conservation Service [SCS] 1975). However, these original soils were developed on alluvium.

2.1.3 Land Use

Land use surrounding the Omaha Shops is predominantly industrial. Neighboring businesses include the Omaha Dock, Williams Brothers, ASARCO, Nebraska Machinery, Caterpillar, Air Products, Air Lite Plastics, UPRR Research and Development Laboratory, Aaron Ferer Scrap Metal, and Cargill.

2.1.4 Climate

The climate in the Omaha area is typically continental with hot summers and cold winters. The mean annual temperature is 51°F (Miller and Thompson 1975) with the average annual high temperature being 101°F and the average annual lowest is 14°F (SCS 1975). The average annual precipitation is 28.4 inches.

2.2 SURFACE HYDROGEOLOGY

The major surface water body in the vicinity of the Omaha Shops is the Missouri River. Surface drainage is primarily to the east toward the Missouri River.

2.3 GEOLOGY

Regionally, the Omaha area is part of the Great Plains physiographic province. The upland is covered with alluvium deposits of Peoria Loess and younger loess. The loess is underlain by glacial till deposits of various ages. Bedrock, underlying the glacial till, crops out at a few locations in steep or broken areas at stream or river borders (SCS 1975).

The Omaha Shops were originally constructed within the Missouri River floodplain. The site was prone to periodic flooding prior to 1952, when the U.S. Army Corps of Engineers built a levee and floodwall along the river, which currently protects the Omaha Shops from flooding.

Shallow unconsolidated deposits at the site are characterized by fill and alluvium. Previous investigations at and near the site indicate that fill ranges in thickness from 1 to 9 feet, with the thickest fill deposits near the river channel. The fill consists of cinders, bricks, glass, metal, and gravel, in a matrix of silt (HDR 1990). Alluvial deposits consisting of interbedded clay, silt, sand, and gravel underlie the fill. The alluvial sequence lies above bedrock, which is about 20 to 50 feet below ground surface (UPRR 1984).

Bedrock is of Pennsylvanian age and consists of alternating beds of limestone and shale. Three different formations are normally encountered in this location; the Wyandotte Limestone, the Lane Shale, and the Iola Limestone. These formations are of the Kansas City Group of the Missouri Series (UPRR 1984).

2.4 HYDROGEOLOGY

Shallow groundwater is encountered at the site at depths ranging from approximately 3 to 15 feet below ground surface (W-C 1995). Groundwater appears to flow easterly, with a calculated hydraulic gradient in the direction of flow estimated at 0.01 feet per foot (HDR 1990). The alluvial sediments are expected to have a low hydraulic conductivity with a range of 0.3 to 0.003 feet per day. Hydraulic recharge is likely from surface infiltration due to the porous characteristics of the surface fill materials (UPRR 1984).

- Removal of surface soil where contaminant concentrations exceed corrective measure objectives.
- Use of institutional controls including deed restrictions and local zoning requirements in order to ensure future use is consistent with risk assessment and corrective action objectives for protection of human health.

3.2.1 Selection of Corrective Measure

The corrective measure for OU1 was selected from three alternatives considered to be feasible methods of addressing lead-contaminated soils. The three alternatives are as follows:

- Alternative 1A – Excavate and off-site disposal of lead-contaminated soils
- Alternative 2A – Cover lead-contaminated soils
- Alternative 3A – Excavate and on-site disposal of lead-contaminated soils

The corrective measure was selected using a detailed screening process based on five criteria: long-term reliability and effectiveness; reduction of toxicity, mobility, and volume (TMV); short-term effectiveness; implementation; and costs. Based on this screening, an alternative was selected which best addresses the lead contamination in soils. The proposed corrective measure, which provides the best balance of the selection factors, is excavation and on-site disposal. Specific information on the selection process is detailed in the Corrective Measures Study (URSGWC 1999).

3.2.2 Description of Corrective Measure

The proposed corrective measure, Alternative 3A - excavation and on-site disposal, consists of excavating the top 12 inches of site soils in areas that contain greater than 1,218 mg/kg of lead, except in the area under the proposed road embankment. Contaminated soil in areas that will have subsurface construction will be excavated below 12 inches to achieve the corrective action objectives and backfilled with clean soil. A layer of colored woven material will be placed under the clean soil backfill as a permanent marker of remaining soil above the corrective action objectives.

Prior to excavation, the existing grass will be mowed, collected, and shipped to a landfill. Concrete slabs will be demolished, stockpiled, ground up, and reused or hauled off site. Excavated soils will be used as a base in the roadway embankment for the Cuming Street and Abbott Drive connection over the UPRR tracks. During excavation, the top 3 inches of soil will be stockpiled for use in the toe of the proposed roadway embankment. The bottom 9 inches of excavated soil will be placed in the proposed roadway embankment. The top of the embankment will be covered with 12 inches of clean soil and the sideslopes covered with 36 inches of clean soil (Figure 3-1). The cover will be graded in such a manner to prevent ponding of rainwater on the surface of the cover. The limits of excavation and proposed embankment are shown on Figure 3-2. Appropriate dust control measures will be taken to prevent exposure to contaminants both during the excavation of lead-contaminated soils and during construction of the cover.

The purpose of the corrective measure is to provide a cost-effective, technically feasible solution to meet the corrective measure objectives. To be consistent with the Order, the corrective measure was selected in accordance with Appendix E of the Order and includes the basic RCRA elements:

- Be protective of human health and the environment
- Attain media cleanup goals
- Control the source(s) so as to reduce or further eliminate, to the extent practicable, further releases that may pose a threat to human health and the environment
- Comply with waste management standards

The contaminant of concern at OU1 is lead in surface and shallow soils. Future releases to the site are believed to be eliminated as operations within OU1 and the property adjacent to OU1 have ceased. Human exposure to soils can be reduced through institutional and engineering controls. This will achieve the basic standard of the Order, which is to protect human health and the environment.

3.1 OU1 CORRECTIVE MEASURE OBJECTIVES

The objectives focus on the exposure setting for which protection will be provided. Exposure settings take into account the chemical of potential concern, media of concern, and exposure pathways. Specific information on the development of the corrective measure objectives is presented in the Corrective Measures Study (URSGWC 1999) for OU1. The corrective measure objectives for OU1, based on proposed future land use, site knowledge, and potential risks, are:

- Reduce the potential for the current occupants, future construction workers, and recreational users to be exposed to site surface and shallow soils containing lead in excess of 1,218 milligrams per kilogram (mg/kg).
- Reduce the potential for future construction workers doing intrusive work to come into contact with subsurface soils containing lead in excess of 1,218 mg/kg.
- Ensure objectives continue to be met after the completion of future construction work.

Contaminated material and waste streams that are generated from implementation of the corrective measure will be treated, stored and disposed of in accordance with all applicable waste management standards.

3.2 CORRECTIVE MEASURE

The corrective measure for OU1 was selected based on the objectives that are protective of public health and the environment set for the City of Omaha's proposed redevelopment of OU1. The scope of the corrective measure generally includes:

- Removal of subsurface soil where contaminant concentrations exceed corrective measure objectives where excavation will occur.

Drilling and soil sampling information was used to determine the excavation limits. Confirmation soil sampling will be collected from the excavation for laboratory analysis to confirm that performance standards have been achieved. The frequency of sampling and testing methodology are detailed in the DCQAP. Final excavation limits will be based on achieving performance standards.

The contaminated soils will be excavated using standard earthwork equipment capable of excavating to the required depths. Deeper excavation will use bracing or use minimum open-cut slope requirements by Occupational Safety and Health Administration (OSHA) for the appropriate site soil type(s).

Any sewers or other buried utilities that are encountered during excavation will be temporarily supported or relocated as necessary to maintain service. Rail tracks, bridge piers, light poles and all other structures will be protected with minimum clearances from excavation.

All monitoring wells located within the excavation limits will be abandoned by a licensed water well contractor in accordance with Nebraska Title 178.

3.5 OPERATION AND MAINTENANCE REQUIREMENTS

Operation and maintenance (O&M) of the corrective measure will begin immediately after completion of the corrective measure. The purpose of the O&M is to maintain the integrity of the remediated areas. Preliminary O&M requirements will include the following:

- Periodic inspections to ensure the cover has not been disturbed, eroded, or otherwise compromised
- Repairs to the cover, as necessary, resulting from erosion, burrowing animals, unauthorized traffic or other damage

3.6 LONG-TERM MONITORING AND MAINTENANCE

Long-term monitoring and maintenance will be required to verify that contaminants are being controlled by the corrective measure. Groundwater monitoring is not included as part of OU1, instead, groundwater monitoring will be done site-wide, as part of the OU3 site activities. Long-term maintenance will include cover inspections and repairs, as described in Operation and Maintenance Requirements, and the following institutional controls:

- Permanent indicator where subsurface contamination has been removed
- Deed restrictions
- Restrictive easements or covenants
- Local land use (zoning) restrictions

Due to the logistics of constructing a new railyard and removing existing railyard tracks, the excavation will be completed in two phases. The soil beneath the existing tracks to the west will be excavated in the fall of 2000. The soil beneath the existing tracks to the east will be excavated where practicable in the spring of 2001, after the tracks have been removed. The soil placed in the proposed roadway embankment in the summer of 2000 will be covered with plastic sheeting until the remainder of the soil can be excavated and the final clean soil cover placed.

UPRR will maintain ownership of approximately 50 feet of property along the eastern edge of the site. No action is proposed in this area since the property will be covered with rail, ballast, and an access road.

3.2.3 Performance Standards

In developing the risk assessment presented in the RFI report (URSGWC 1999), it was assumed that OU1 would be developed as proposed by the City of Omaha into a convention center and arena complex. The corrective measure was designed to provide adequate protection of workers during construction activities and protection of the on-site workers and recreational users of the facility. Protection will be achieved by reducing the potential for exposure to site surface and shallow soils with lead levels in excess of 1,218 mg/kg.

3.3 BASIS OF DESIGN

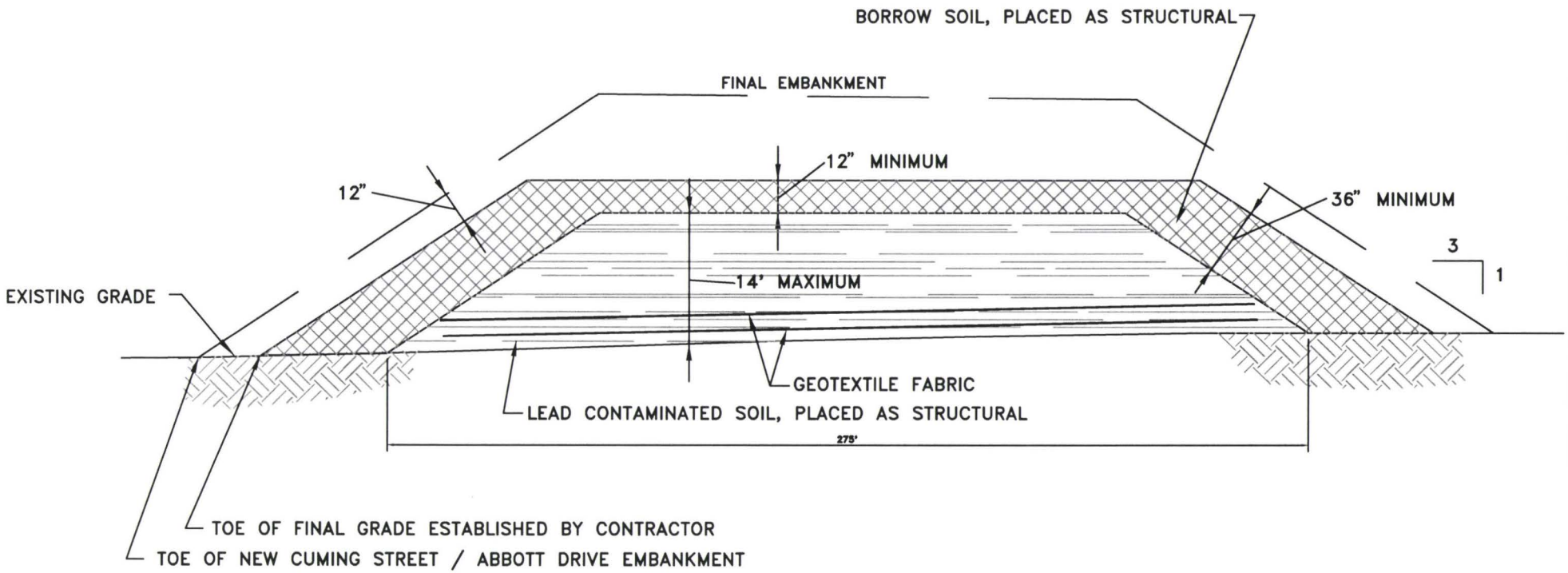
The CMI for the lead-containing soils is based on the following:

- The excavation limits are to encompass the area of contaminated soil found by drilling and soil sampling during the RFI. Actual excavation limits will be based on achieving performance standards as determined by confirmatory sampling at the time of excavation.
- The appropriate number of confirmation samples to evaluate whether the excavation limits have reached performance standards will be based on statistical methods.
- Surface water run-on and run-off controls will be based on precipitation data for Omaha, Nebraska, and an evaluation of drainage basins and drainage flow patterns in the remediation area.
- Dust control and particulates will be monitored during excavation.

3.4 PRELIMINARY DESIGN CRITERIA

Surface and shallow soils within OU1 have been found to contain lead at levels above the corrective measure objectives. Contaminated soils from this area will be excavated, reused, and covered to achieve the performance standards. The design soil volume is based on sampling and analysis completed during the RFI (URSGWC 1999). The estimated volume of lead-contaminated soils at OU1 is:

- *In-situ* volume = 22,000 cubic yards
- *Ex-situ* volume = 28,6000 cubic yards



ROADWAY EMBANKMENT CROSS SECTION

OMAHA SHOPS
UNION PACIFIC RAILROAD COMPANY

URS Greiner Woodward Clyde

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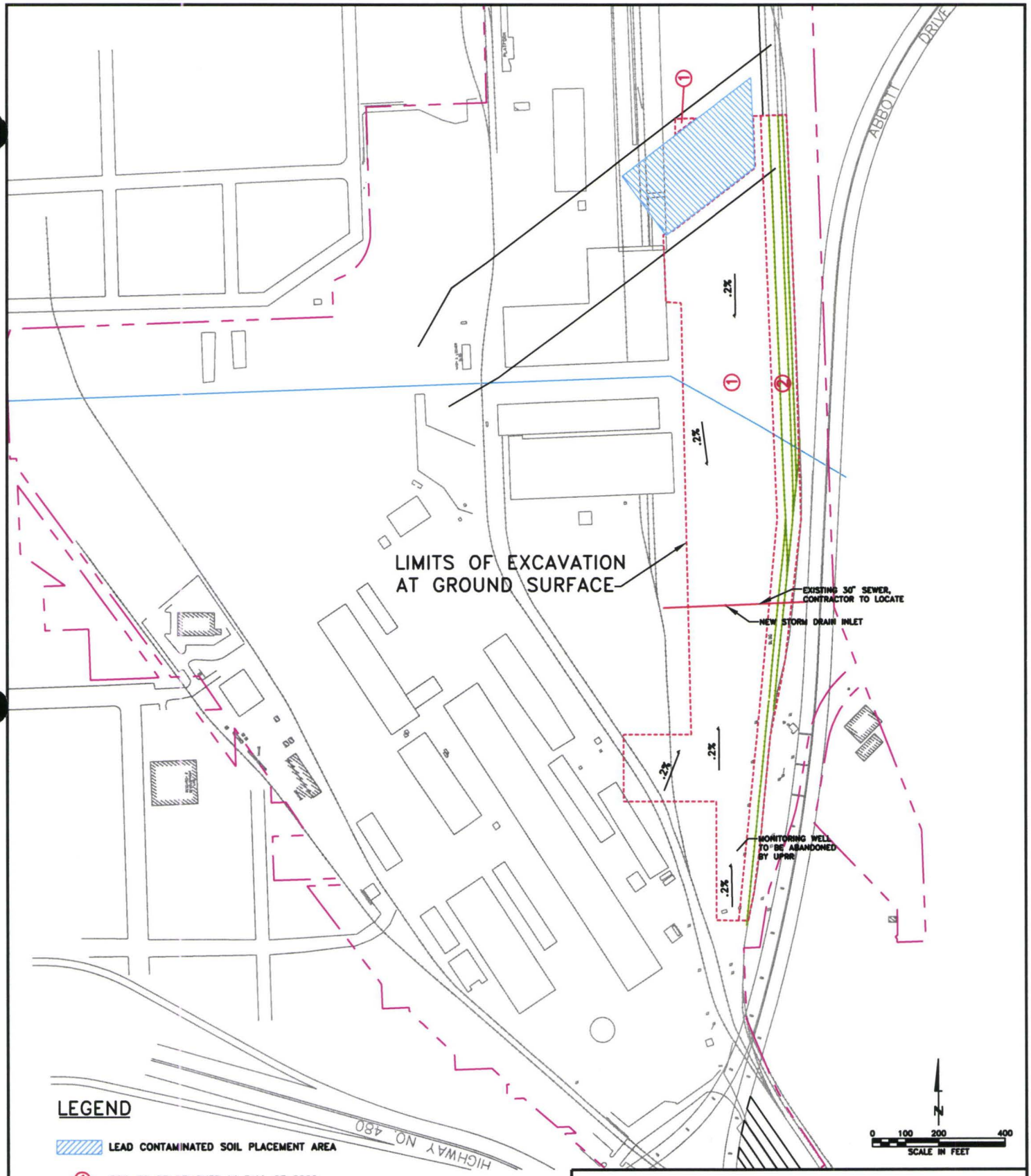

LEGEND

- LEAD CONTAMINATED SOIL PLACEMENT AREA
- ① SOIL TO BE REMOVED IN FALL OF 2000
- ② SOIL TO BE REMOVED IN SPRING OF 2001
- TRACK TO BE REMOVED IN SPRING OF 2001
- TOE OF NEW CUMING ST / ABBOTT DRIVE EMBANKMENT
- 16" METROPOLITAN UTILITIES DISTRICT (MUD) WATER MAIN

OU1 EXCAVATION LIMITS

OMAHA SHOPS
UNION PACIFIC RAILROAD COMPANY

URS Greiner Woodward Clyde

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4.1 HEALTH AND SAFETY PROVISIONS

The corrective measure will be completed in conformance with the requirements of part 1910.120 of Title 29 of the Code of Federal Regulations (29 CFR 1910.120), "Hazardous waste Operations and Emergency Response." This regulation requires:

- Development and implementation of a written safety and health program for employees involved in hazardous waste operations
- A written site-specific safety and health plan to address the hazards of each phase of the Site operation, including requirements and procedures for employee protection and responses to spills and emergencies.

An HSP, detailing the proposed health and safety measures to be implemented during the corrective measure, is attached. Contract documents will require that remediation contractor(s) submit written documentation of its safety and health program. Additionally, the contract documents will require the remediation contractor(s) to prepare a HSP that is equally or more stringent.

4.2 SPECIAL TECHNICAL CONSIDERATIONS

4.2.1 Area Air Monitoring

Baseline air sampling will be completed about one week prior to the start of corrective measure activities. The baseline air sampling will be used to establish site-specific background levels of lead in air. Baseline samples will be collected outside of the OU1 area at locations described in the HSP.

4.2.2 Air Monitoring During Corrective Measure Activities

Air monitoring will be completed during all excavation and construction activities to determine if fugitive dust particles (i.e., dust particulates containing lead) are being generated. Air monitoring locations, sampling equipment, and analytical requirements are described in the HSP. Engineering controls will be used as part of the corrective measure to help minimize off-site release of contaminated dust. These controls include application of water, dust barriers, and/or wetting agents. Air monitoring will be dependent on field activities and weather conditions. If off-site dust becomes a problem, activities may be suspended until the proper controls can be implemented.

4.2.3 Confirmation Sampling

Confirmation soil samples will be collected to confirm that excavation activities have removed all of the lead-contaminated soil above the 1,218 mg/kg concentration. Each confirmation sample will consist of a 5-point composite sample collected within a 250-foot by 200-foot sampling grid. The composite samples will be analyzed for total lead using Method 6010. The Site Manager and Quality Control field personnel will determine the sampling locations.

Locations will be chosen to best represent the lead-contaminated excavation area. Additional excavation and sampling may be required based on the confirmation sampling results.

4.2.4 Waste Management Procedures

Since the lead-contaminated soil will be used for an on-site roadway embankment, there will be no hazardous waste materials leaving the site. Nonhazardous waste generated from construction activities will be disposed of off-site in accordance with waste management standards. Potential wastes include grass clippings, concrete, and construction rubble. Grass at the site will be mowed, collected, and disposed of in an off-site landfill. Concrete slabs will be demolished; stockpiled, ground up, and reused or hauled off site along with any other generated construction rubble.

4.3 PERMITS AND REGULATORY REQUIREMENTS

A storm water discharge permit will be required for discharge of water into the City of Omaha sanitary sewer system. The permit will contain requirements for allowable water quality. An additional grading permit will also be acquired. The City of Omaha will issue the two permits.

4.4 ACCESS, EASEMENTS, RIGHT-OF-WAY

4.4.1 Underground Utilities

Underground utilities will be located prior to the start of corrective measure excavation activities. Active utility lines located within the proposed excavation area will be protected to prevent interruption of service.

4.4.2 Traffic Routes

Vehicular and pedestrian traffic will be maintained in all public right-of-ways to provide proper public safety throughout the corrective measure site activities.

4.4.3 Protection of Adjacent Areas

Abatement, storage, transportation, and disposal work will be completed without damaging or contaminating adjacent areas. Where such areas are damaged or contaminated as verified by visible inspection and/or sampling and analysis, the Contractor will restore or decontaminate the affected areas to the original condition, as approved by the UPRR representative.

4.4.4 Site Cleanup

The spread of dust and debris will be restricted during all corrective measure activities. Lead containing debris, soil, rubble, and waste will not be distributed over the work area. Upon completion of the corrective measure activities and a satisfactory initial inspection by the UPRR representative, a final cleanup will be completed by the contractor(s). This cleanup will include final decontamination and then removal of any contaminated material and debris from the work

area. A UPRR representative will complete a final inspection of the site for final approval of the Contractor's work.

4.5 CONTINGENCY PROCEDURES

In the event of unforeseen circumstances where the corrective measure and corrective measure objectives cannot be implemented or need to be modified, new corrective action objectives or corrective measures may be necessary. Selection of new corrective action objectives, changes to the corrective measure, or selection of a new corrective measure will require a new public comment period to allow the public to review and comment on any changes from this CMI Work Plan. If problems occur in the field where changes to the current design and/or specifications are necessary, they will be clearly noted including the reason for the change and the necessary actions required to complete the corrective measure. All changes will require notification of the EPA before implementation.

In the event of a construction emergency, the USEPA will be orally notified with 24 hours of the event, and will receive written notice of the incident in within 72 hours of the event. The written notice will include the specifics of the accident, the response action taken and/or planned, and any potential impacts on human health and/or the environment. Emergency procedures, contacts, and phone numbers are included in the HSP.

The following sections describe the preliminary schedule and cost estimate to complete the corrective measure.

5.1 PRELIMINARY CONSTRUCTION SCHEDULE

At this time, the corrective measure construction schedule is preliminary and actual construction time frames will not be known until Final regulatory approval has been received and construction contracts have been awarded. Estimated time frames and major milestones are presented on Figure 5-1.

5.2 COST ESTIMATE

Capital costs associated with the corrective measure are excavation, on-site transportation, on-site backfill of the contaminated soil, and clean backfill for the top and side slope cover. Capital costs are estimated at $304,000. O&M is estimated to cost $15,500. Present worth costs for the 15-year duration are estimated at $465,000. The corrective measure alternative capital, O & M, and present worth costs are presented in Table 5-1.

TABLE 5-1

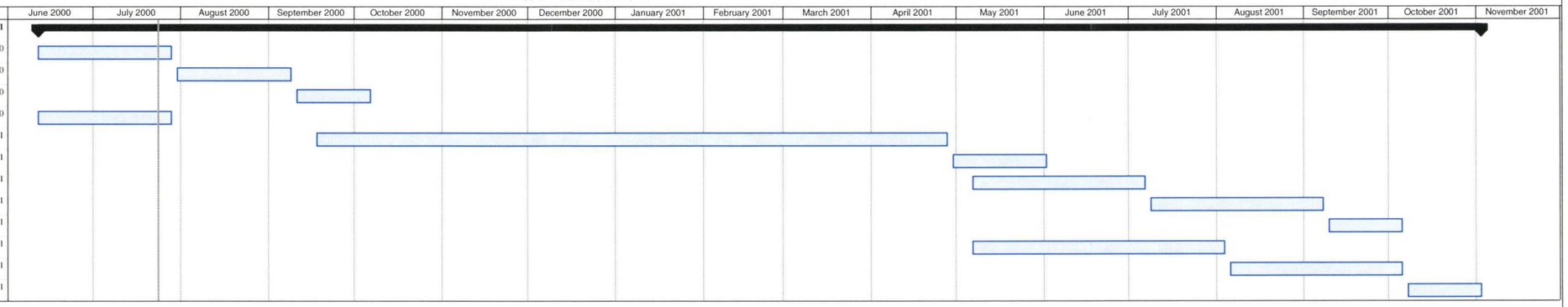
SUMMARY OF TOTAL COSTS FOR CORRECTIVE MEASURE UPRR - OMAHA SHOPS

Alternative:	1C - Lead-Contaminated Soils	Expected Accuracy Range:	+50% to -30%
Description:	Excavate, Reuse, Cover	Present Worth Discount Rate:	7%
Site:	UPRR - Omaha Shops	Base Year of Estimate:	2000
Location:	Omaha, NE	Capital Cost Years:	0
Date Prepared:	July 24, 2000	O&M Cost Years:	1-15

DESCRIPTION	QTY	UNIT	UNIT COST	COST	TOTALS	NOTES
CAPITAL COSTS (YEAR 0):						
1. **Monitoring, Sampling, Testing, Analysis**						
a. Confirmation Sampling - Lead	100	EA	$15.00	$1,500		
b. Air Monitoring Station (includes calibrator)	2	LS	$750.00	$1,500		Two month rental.
c. Air Sampling Cartridge Analysis	64	EA	$40.00	$2,560		One per day per unit.
SUBTOTAL				$5,560		
2. **Main Sitework**						
a. Institutional Controls	1	LS	$3,000.00	$3,000		
b. Site Preparation	1	LS	$2,000.00	$2,000		Fencing, Outhouse, Parking, Erosion Cont.
c. Excavate Lead	22,000	CY	$3.00	$66,000		
d. Lead soil for Berms	22,000	CY	$5.00	$110,000		Load, Transport and Backfill
SUBTOTAL				$181,000		
3. **On-Site Treatment (Lead Cover)**						
a. Borrow, Fill, Spread, and Compact	1,460	CY	$10.00	$14,600		
SUBTOTAL				$14,600		
SUBTOTAL 1					$201,160	
Contingency (% of Subtotal 1)		35%		$70,406		20% scope + 15% bid
SUBTOTAL 2					$271,566	
Project Management and Support (% of Subtotal 2)						
a. Project Management		2%		$5,431		
b. Engineering / Design		6%		$16,294		
c. Construction Management		4%		$10,863		
SUBTOTAL				$32,588		
TOTAL CAPITAL COSTS - YEAR 0					$304,154	
TOTAL O&M COSTS - YEAR 1-15					$161,144	
TOTAL PRESENT WORTH COSTS					$465,298	

FIGURE 5-1
PROPOSED UPRR OMAHA SHOPS
CMI WORK SCHEDULE

ID	Task Name	Duration	Start	Finish
1	**OU1 CMI**	**509 days**	**Mon 6/12/00**	**Fri 11/2/01**
2	Draft CMI Work Plan	47 days	Mon 6/12/00	Fri 7/28/00
3	EPA Review	40 days	Mon 7/31/00	Fri 9/8/00
4	Final CMI Work Plan	26 days	Mon 9/11/00	Fri 10/6/00
5	CMI (Phase I)	47 days	Mon 6/12/00	Fri 7/28/00
6	Track Removal	222 days	Mon 9/18/00	Fri 4/27/01
7	CMI (Phase II)	33 days	Mon 4/30/01	Fri 6/1/01
8	Draft CMI Report	61 days	Mon 5/7/01	Fri 7/6/01
9	EPA Review	61 days	Mon 7/9/01	Fri 9/7/01
10	Final CMI Report	26 days	Mon 9/10/01	Fri 10/5/01
11	Draft CM Compl Rpt	89 days	Mon 5/7/01	Fri 8/3/01
12	EPA Review	61 days	Mon 8/6/01	Fri 10/5/01
13	Final CM Compl Rpt	26 days	Mon 10/8/01	Fri 11/2/01



Project: Pjsch5-1
Date: Mon 7/24/00

Task | Progress | Summary | Rolled Up Split | Rolled Up Progress | Project Summary
Split | Milestone | Rolled Up Task | Rolled Up Milestone | External Tasks

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DRAFT

CMI DATA MANAGEMENT PLAN OPERABLE UNIT NO. 1 (OU1)

Omaha Shops

Prepared for
Union Pacific Railroad Company
Omaha, Nebraska

UNION PACIFIC

ENVIRONMENTAL MANAGEMENT

July 2000

URS
101 South 108th Avenue
Omaha, Nebraska 68154

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AOC	Area of Concern
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
COC	Chain of Custody
CQA/QCP	Construction Quality Assurance/Quality Control Plan
DCQAP	Data Collection Quality Assurance Plan
DMP	Data Management Plan
HSP	Health and Safety Plan
NDEQ	Nebraska Department of Environmental Quality
Order	Administrative Order on Consent
OU	Operable Unit
PC	Project Coordinator
PMP	Project Management Plan
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
SDG	Sample Delivery Group
STS	Sample Tracking System
UPRR	Union Pacific Railroad Company
URS	URS Corporation
USEPA	U.S. Environmental Protection Agency

1.1 BACKGROUND

The Union Pacific Railroad Company (UPRR) Omaha Shops are the subject of a United States Environmental Protection Agency (USEPA) Order on Consent (Order) under Section 3008(h) of the Resource Conservation and Recovery Act (RCRA). The Order requires UPRR to complete a Corrective Measures Implementation (CMI) Work Plan for Operable Unit 1 (OU1) within the Omaha Shops.

This Data Management Plan (DMP) is part of a set of planning documents that includes a Project Management Plan (PMP), Data Collection Quality Assurance Plan (DCQAP), Health and Safety Plan (HSP), and Construction Quality Assurance/Quality Control Plan (CQA/QCP). These plans are required for the CMI Work Plan as specified in the Order.

1.2 DATA MANAGEMENT OBJECTIVES

The goal of the DMP is to document procedures for tracking and management of investigation data collected during the CMI at the Omaha Shops. The primary data management objective is to provide data of known quality to end users and decision-makers. The DMP is primarily directed toward the collection (receipt) and management of the data from chemical testing of the field samples, but all other data are considered in planning for data management.

This DMP describes the project data filing system, procedures for tracking and storing analytical data, and data report formats. The DMP also addresses requirements for information contained in each analytical data record, and it provides examples of information presentation formats, including tabular and graphical displays.

1.2.1 Non-Critical Data

In accordance with the DCQAP, data have been defined as non-critical data if they are not used to make final decisions concerning nature and extent of chemicals in environmental media. Non-critical field and technical data generated during the CMI are expected to consist of the following categories of information:

- Local geologic and hydrogeologic information
- Maps, site plans, sketches, cross sections, and tables
- Field notes (narrative information)
- Site survey coordinates and sampling point identification
- Field screening results
- Sample collection and handling data
- Sample tracking information
- Documentation for handling of investigation-derived waste

In addition to the above data, existing non-critical data gathered by previous site investigations will be included in the project database as appropriate.

1.2.2 Critical Data

In accordance with the DCQAP, data have been defined as critical data if they are used to make final decisions concerning nature and extent of chemicals in environmental media. Critical field and technical data generated during the CMI are expected to consist of the following information:

- Chemical analytical data generated by on-site and off-site laboratories

The goal of the DMP with regard to analytical data is to provide data of known quality for the end user. The analytical data will be added to an electronic database that holds all previously collected analytical data. The data management process will also provide the status of the database directly to the end user. The DMP process is designed to eliminate errors in the database and to provide documentation that corrections have been completed.

In addition to the above data, available non-critical data gathered by previous site investigations will be included in the project database as appropriate.

2.1 PROJECT FILES

A project file containing complete documentation of all aspects of the activities associated with the work completed at the Omaha Shops site will be maintained by the UPRR Project Coordinator (PC). A preliminary outline for the project file follows.

1. Management
   - Schedule
   - Budget
   - Subcontracts

2. Communications
   - With EPA
   - With Subcontractors (separate file for each)

3. Quality Assurance/Quality Control Procedures
   - Chain-of-Custody
   - Audits Reports
   - Laboratory Quality Control Reports
   - Deviation Notification Forms
   - Nonconformance/Corrective Action Reports
   - Daily Quality Control Reports

4. Technical Information
   - Analytical Data
   - Field Data
   - Field Logbooks
   - Data Quality Evaluation Forms
   - Calculations/Evaluations
   - Regulatory Compliance

5. Health and Safety
   - Plans/Procedures
   - Audit Reports

6. Documents
   - Plans
   - Reports
   - Relevant Publications

Additional file categories and subcategories may be added at the UPRR PC's discretion. All files will be kept for a minimum of 6 years after termination of the order. The USEPA and Nebraska Department of Environmental Quality (NDEQ) will be notified by UPRR 60 days prior to the destruction of any files.

2.2 DATA LOCATION

Project data files will be kept in a central location specified by the UPRR PC.

2.3 DATA FILE MAINTENANCE PROCEDURES

Project documentation will be checked for completeness to include peer reviews, checking of calculations, and Professional Engineer signatures on drawings, where appropriate, before being included in the project file.

Analytical data management includes procedures for tracking, storing, and accessing analytical data. Figure 3-1 shows the flow of analytical data through the data management process.

3.1 TRACKING PROCEDURES

Sample tracking and data management includes all forms of data collection and documentation and may include review of Chain-of-Custody (COC) forms, laboratory sample receipt forms, and tracking outstanding analyses. A sample tracking system (STS) will be in place prior to the initiation of field sampling activities and will consist of a simple spreadsheet, such as Excel™. An example sample tracking form is shown on Figure 3-2. The STS will, as a minimum, contain the following information:

- The designated Sample Delivery Group (SDG) number
- Sample field identification number
- Laboratory name and sample identification
- The date collected
- The sample matrix
- The analyses requested including the method number
- The assignment of quality control (QC) and quality assurance (QA) samples (e.g., field replicates, splits, rinsates, matrix spikes, and source blanks)
- The fields for indicating the following data completion stages:
  - Receipt of hard copy and electronic data from the laboratory
  - Completion of the QC check of hard copy to electronic files
  - Completion of a QC data review
  - Addition of data review qualifiers
  - Check of final data tables to electronic data

The sample COC forms and sample receipt forms serve as the initial data entry sheets for the STS. They provide field sample identification numbers, laboratory name and identification numbers, date of collection, SDG number, and sample matrix analyses requested.

All laboratories that receive samples collected at the site will be required to provide sample receipt confirmation. This confirmation will include a copy of the tabular listing showing the samples entered into the laboratory's data management system by SDG number, the corresponding laboratory sample identification number, and the analyses requested for each sample.

The Project Chemist (or designee) is responsible for checking the confirmation received from the laboratory versus the COC form(s) to determine whether:

- All samples were received by the laboratory's data management system
- All samples and analyses were correctly entered into the laboratory's data management system

- Unique field identification numbers and laboratory identification numbers were assigned to each sample

The Project Chemist (or designee) will notify the laboratory by phone or fax of any discrepancies observed during the sample confirmation check.

Upon completion of sample analyses, the laboratory will submit both hard copy and electronic analytical data package for each SDG of 20 samples or less. Upon receipt of the analytical data for an SDG, the Project Chemist will:

- Update the STS to indicate that data were received
- Notify the Project Manager that the data have been received
- Verify all required samples/analyses were collected and analyzed as specified
- Begin the QC review

If the SDG is missing any sample results or if there are any discrepancies, the Project Chemist will notify the laboratory and request resubmission of the missing data, if possible. Discrepancies may require resampling.

If the SDG is complete or if the data are sufficient for review, the review will begin. Following review of the data for an SDG, assignment of appropriate data qualifiers (if required), and peer review, the data reviewer will update the STS to indicate that the data review has been completed and that qualifiers have been assigned.

The use of the STS helps to ensure that the proper steps in data management are followed and documented. The Project QA/QC Officer (or designee) will check a minimum of one SDG per project study to verify that the steps documented as complete were performed (e.g., sample data received, SDG data package complete, data validation complete, data qualifiers entered into database).

3.2 STORAGE AND ACCESS OF ANALYTICAL DATA

3.2.1 Hard Copy Data

Analytical data generated by the field or fixed laboratory will be in a format specified in the DCQAP. As part of the data deliverable requirements, the Project Manager and Project Chemist shall receive the hard copy data from the laboratory. The Project Chemist will compare hard copy data against the electronic reporting copy to ensure data consistency. If any discrepancies are discovered, the Project Chemist will contact the Project Manager.

3.2.2 Electronic Data Files

Data deliverable requirements from the laboratory will be determined prior to the start of the CMI fieldwork and will be documented in a contract or contract addendum. Electronic deliverables will be in a specific format, and the laboratory will be notified that they will be held

responsible for ensuring that electronic deliverables will accurately reflect the data reported in hard copy format. As part of the data deliverable requirements, the Project Chemist will receive the electronic data from the laboratory. It will be the Project Chemist's (or designee's) responsibility to update the sample tracking system and complete the QC review.

3.2.3 Management Information System

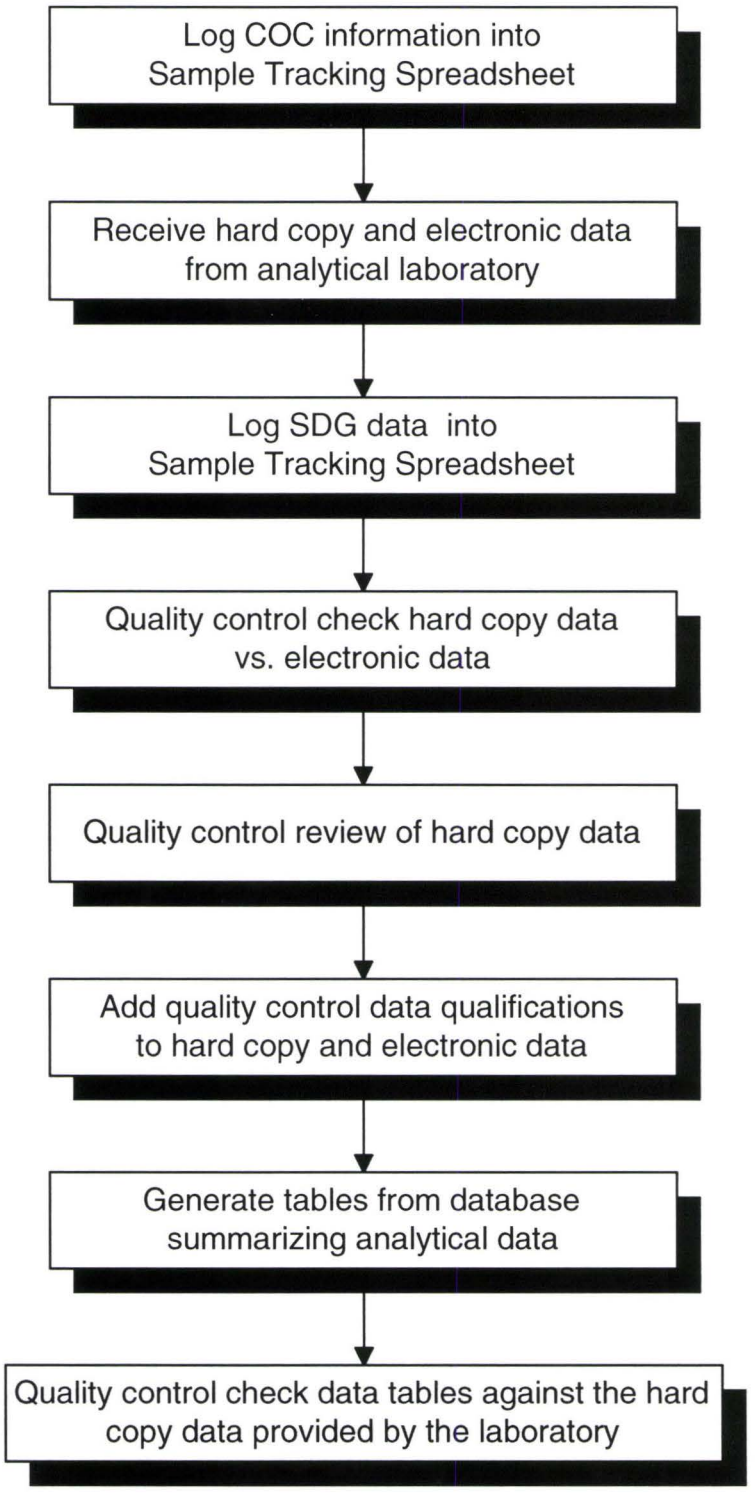
The Project Manager will select the data management information system. The selection will account for the needs of the data users, as well as the efficiency and flexibility of commercially available management information system programs.

3.2.4 Database Structure

The database structure will be designed to generate appropriate reports and tables, to provide systematic data review and access, and to optimize data use. Different types of data (e.g., physical and chemical parameters with associated location information) from a variety of sources will be collected at various times. An appropriate automated database management system will be selected to accommodate the various data types generated by the CMI and to allow easy reporting, retrieval, and site characterization.

3.2.5 Database Export Capabilities

The data management software chosen for the Omaha Shops CMI has export capabilities. Data will be exported from the database by various end users. It will be possible for the end user to query specified parts of the database for the necessary information quickly and easily.



UNION PACIFIC ENVIRONMENTAL MANAGEMENT

URS

ANALYTICAL DATA MANAGEMENT FLOW CHART
UPRR OMAHA SHOPS - OMAHA, NEBRASKA

DRN. BY: jdg	DATE: 07/24/00	PROJECT NO.	FIG. NO.
CHK'D. BY:	DATE:	45-091MC204.02	3-1

q:\91mc20~2\ou1cmi~1\dmp_f3-1.vsd 7/24/00 2:41 PM (jdg) (1 of 1)

	Collection					Parameters			Data Status						
Laboratory SDG	Date	Time	URSGWC Field ID	Sample Matrix	QC Sample Type (Dup/MS)	VOCs (8260B)	SVOCs (8270C)	Metals (6010/7000)	Date Lab Received	Date Package Due	Date Package Received	Date EDD Review Done	Date QC Review Done	Date QC Validation Done	Date QC Review QC'd

SAMPLE TRACKING SYSTEM
UPRR OMAHA SHOPS - OMAHA, NEBRASKA

DRN. BY: jdg	DATE: 07/24/00	PROJECT NO.	FIG. NO.
CHK'D. BY:	DATE:	45-091MC204.02	3-2

q:\91mc20~2\ou1cmi~1\dmp_f3-2.vsd 7/24/00 2:43 PM (jdg)

4.1 SOFTWARE

The software most commonly used for tabular presentation of data is Microsoft Excel™. Data exported from the database is in a specified format that can be run through an Excel™ macro. Macros will be used for creating tables of data.

The following data may be presented in tabular displays:

- Unsorted (raw) data
- Results for each medium or for each constituent monitored
- Data reduced for statistical analysis
- Data sorted by potential stratification factors (e.g., location, soil layer, and topography)
- Summary data

4.2 Standard Format

The tabular presentation of repetitive-type data will be in a standard format. An example table presenting chemical analytical data is provided in Appendix A. Other tabular presentations of data, such as survey information, will be presented in tabular formats approved by the URS Project Manager.

5.1 SOFTWARE

The software that will most commonly be used for graphical presentation of data is Microsoft Excel™. Other graphics programs, such as Arcview™ will be used to display geospatial data.

Graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three-dimensional graphs, etc.) may be used to:

- Display sampling locations and sampling grid(s)
- Indicate boundaries of sampling areas and areas where more data are required
- Display chemical concentrations at each sampling location
- Display geographical extent of chemicals
- Display chemical concentration averages and maxima
- Illustrate changes in chemical concentrations in relation to distance from the source, time, depth, or other factors
- Indicate features affecting intra-media chemical transport
- Show potential receptors
- Illustrate the geology and hydrogeology in the area of the Omaha Shops

5.2 STANDARD FORMAT

The graphical presentation of repetitive type data will be in a standard format. Line graphs will be used to show target chemicals of potential concern concentration trends through time at selected locations. Other graphical presentations of data will be presented in formats approved by the URS Project Manager.

6.1 REPORTING DATA

To make efficient use of the database to support decisions, it is important for the end user to know the status (i.e., preliminary or final) and the quality (i.e., qualifiers have or have not been entered) of data in a database. This is of primary importance if preliminary data have been entered into the database and distributed to project personnel. Therefore, every database report generated will indicate the current status of the database. In addition, until the database is finalized (i.e., all data are reviewed, peer reviews are complete, and the database QC is complete), authorization for access to the database will be limited to the Project Manager, Project Chemist, or other designees assigned by the Project Manager.

If there is a need for preliminary data by an end user, authorization must be obtained from the Project Manager. For reports generated from the database prior to the database being deemed final by the Project Manager, the database reports will include a header indicating that the database is **PRELIMINARY**.

For **PRELIMINARY** database reports, the reported sample results are subject to change and should be used with caution by the end user. Preliminary data included in any project progress reports are subject to revision.

All persons who receive copies of the **FINAL** database report will be documented on a distribution list. Any changes to data in the **FINAL** version of the database will be made only with the approval of the Project Manager in consultation with the Project Chemist. If changes are approved and made to the database, then all individuals on the distribution list will be sent a notice that highlights the revisions and will receive a copy of the revised **FINAL** database report.

7.1 PROGRESS REPORTS

UPRR will provide to the USEPA, at a minimum, quarterly progress reports on the design, construction, implementation, and operation of the corrective measure at the Facility. The Quarterly Progress Reports will contain the following information to allow the USEPA to monitor the progress of the cleanup.

- A description and estimate of the percentage of the corrective measure construction completed;
- A description of significant activities (e.g., sampling events, inspections, etc.) and work completed/work accomplishments (e.g., performance levels achieved, hours of treatment operation, treated and/or excavated volumes, concentration of contaminants in treated and/or excavated volumes, nature and volume of wastes generated, etc.) during the reporting period;
- Summaries of all changes made in the corrective measure construction during the reporting period;
- Summary of system effectiveness. Provide a comparison of system operation to predicted performance levels (applicable only during operation of the corrective measure);
- Summaries of all contacts with representatives of the local community, public interest groups Federal or State government during the reporting period;
- Summaries of all findings (including any inspection results);
- Summaries of all problems or potential problems encountered during the reporting period;
- Actions being taken and/or planned to rectify problems;
- Changes in personnel during the reporting period;
- Projected work for the next reporting period; and
- The results of any sampling tests and/or other data generated during the reporting period, as well as copies of the raw data, field logs, etc. which were used to compile those results.

Following completion of the corrective measure construction, the frequency of progress reporting may be reduced to semiannual or annual reports. The frequency of reporting shall be proposed in the Operation & Maintenance Plan, and must be approved by the USEPA.

8.1 ADDITIONAL RECORDS

Additional records pertaining to operating costs and personnel, maintenance, and inspection records will be kept by the UPRR PC. A brief discussion of such records is provided below.

8.1.1 Operating Costs

Records detailing operating costs associated with post corrective measure construction will be detailed in the Operation and Maintenance Manual. A description and estimate of the percentage of the activities completed may be reported in progress reports sent to the USEPA.

8.1.2 Personnel, Maintenance, and Inspection Records

Inspection records, as well as records describing what personnel are on site during the corrective measure construction and required maintenance, will be kept utilizing the following forms:

- Daily Construction Report
- UPRR Omaha Shops Sign-In Sheet

Examples of these forms are included in Appendix A. Additional forms may also be used or be required based on the site activities. The use of additional forms will be coordinated with the UPRR PC and the Site Manager.

TABLE

DETECTED COMPOUNDS IN GROUNDWATER SAMPLES COLLECTED AT UPRR OMAHA SHOPS, OMAHA, NEBRASKA

FIELD ID	Sample ID			Sample ID			Sample ID			Sample ID		
COLLECT DATE	Date			Date			Date			Date		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
VOLATILE ORGANICS (METHOD 8021B) (µg/L)												
Carbon tetrachloride	<	1	U	<	1	U	<	1	U	<	1	U
Chlorobenzene	<	1	U	<	1	U	<	1	U	<	1	U
Chloroethane	<	2	U	<	2	U	<	2	U	<	2	U
Chloroform	<	1	U	<	1	U	<	1	U	<	1	U
Chloromethane	<	2	U	<	2	U	<	2	U	<	2	U
1,1-Dichloroethane	<	1	U	<	1	U	<	1	U	<	1	U
1,1-Dichloroethene	<	1	U	<	1	U	<	1	U	<	1	U
1,2-Dichloroethane	<	1	U	<	1	U	<	1	U	<	1	U
cis-1,2-Dichloroethene	<	0.5	U	<	0.5	U	<	0.5	U	<	0.5	U
trans-1,2-Dichloroethene	<	0.5	U	<	0.5	U	<	0.5	U	<	0.5	U
1,2-Dichloroethene(total)	<	1	U	<	1	U	<	1	U	<	1	U
1,2-Dichloropropane	<	1	U	<	1	U	<	1	U	<	1	U
cis-1,3-Dichloropropene	<	1	U	<	1	U	<	1	U	<	1	U
trans-1,3-Dichloropropene	<	1	U	<	1	U	<	1	U	<	1	U
Methylene Chloride	<	1	U	<	1	U	<	1	U	<	1	U
1,1,2,2-Tetrachloroethane	<	1	U	<	1	U	<	1	U	<	1	U
Tetrachloroethene	<	1	U	<	1	U	<	1	U	<	1	U
1,1,1-Trichloroethane	<	1	U	<	1	U	<	1	U	<	1	U
1,1,2-Trichloroethane	<	1	U	<	1	U	<	1	U	<	1	U
Trichloroethene	<	1	U	<	1	U	<	1	U	<	1	U
Vinyl chloride	<	1	U	<	1	U	<	1	U	<	1	U

µg/L = microgram per liter
U = Nondetected at Reporting Limit
E = Exceeded linear range of calibration curve
RL = Reporting Limit
Qual = Qualifier

URS

DAILY CONSTRUCTION REPORT

CONTRACTOR _____
PROJECT _____
LOCATION _____
DATE _____
PROJECT NO. _____

DAY	S	M	T	W	T	F	S

WEATHER	CLR	P.LY	CLDY	FOG
TEMP	HIGH	75°F	LOW	89°F
WIND	CALM	MOD	HIGH	
PREC	RAIN	LITE	MOD	HIGH
	SNOW	LITE	MOD	HIGH

EQUIPMENT ON SITE	A/I	EQUIPMENT ON SITE	A/I	EQUIPMENT ON SITE	A/I

SUBCONTRACTORS ON SITE	SUBCONTRACTORS (CONT.)	MATERIAL DELIVERED

SUMMARY OF ACTIVITIES/DISCUSSIONS/DECISIONS

DISTRIBUTION: 1. Project File
2. Project Engineer

OBSERVER _____

URS UPRR OMAHA SHOPS SIGN IN SHEET

NAME	COMPANY	DATE	TIME IN	TIME OUT

SignIn.xls 7/24/00

DRAFT

CMI CONSTRUCTION QUALITY ASSURANCE / QUALITY CONTROL PLAN
OPERABLE UNIT NO. 1 (OU1)

Omaha Shops

Prepared for
Union Pacific Railroad Company
Omaha, Nebraska

UNION PACIFIC

ENVIRONMENTAL MANAGEMENT

July 2000

URS
101 South 108th Avenue
Omaha, Nebraska 68154

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CD	Consent Decree
CM	Construction Manager
CMI	Corrective Measures Implementation
COC	Contaminant of concern
CQAO	Construction Quality Assurance Officer
CQA/QCP	Construction Quality Assurance/Quality Control Plan
HSP	Health and Safety Plan
NDEQ	Nebraska Department of Environmental Quality
O&M	Operations and Maintenance
Order	Order on Consent
OU	Operable Unit
PC	Project Coordinator
PM	Project Manager
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
SM	Site Manager
SOW	Statement of Work
UPRR	Union Pacific Railroad Company
URS	URS Corporation
URSGWC	URS Greiner Woodward Clyde
USEPA	United States Environmental Protection Agency

The Union Pacific Railroad Company (UPRR) Omaha Shops are the subject of a United States Environmental Protection Agency (USEPA) Order on Consent (Order) under Section 3008(h) of the Resource Conservation and Recovery Act (RCRA). The Order requires UPRR to complete a Corrective Measures Implementation (CMI) Work Plan at Operable Unit No. 1 (OU1) within the Omaha shops. This Construction Quality Assurance/Quality Control Plan (CQA/QCP) is one component of the CMI Work Plan.

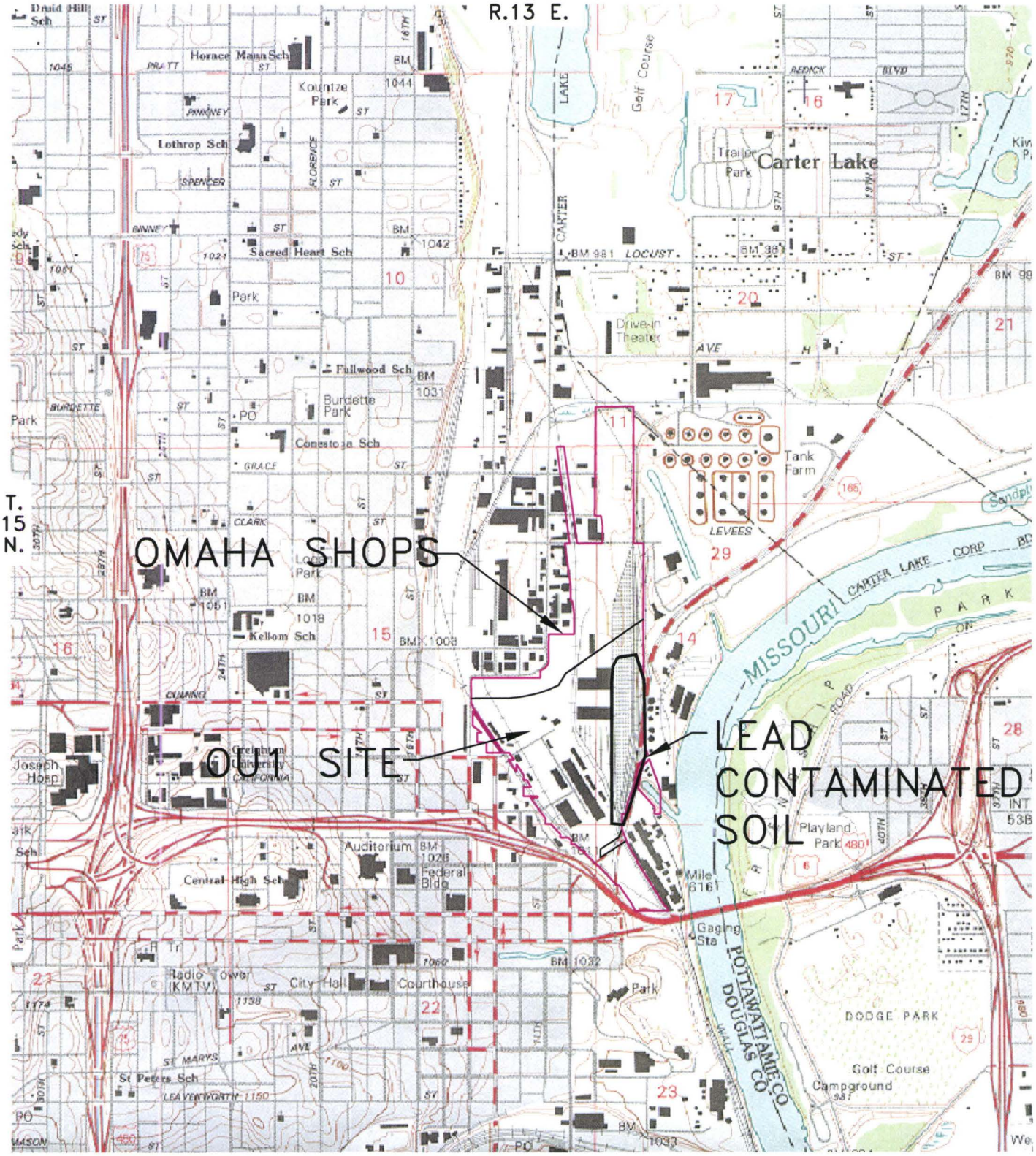
1.1 PURPOSE

The purpose of this CQA/QCP is to describe site specific components of the quality assurance (QA) program which will ensure that the construction activities associated with the CMI meet or exceed the design criteria, plans, and specifications. This CQA/QCP establishes the necessary controls, supervision, observations, and tests of construction work items provided for the CMI.

1.2 CQA/QCP REQUIREMENTS

This CQA/QCP includes the following:

- Responsibility and authority of organizations and key personnel involved in the CMI; and
- Reporting requirements and provisions for record storage of QA activities, including daily field reports, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation.



NEBRASKA

QUADRANGLE LOCATION

BASE MAP SOURCE: USGS 7.5 MINUTE SERIES (TOPOGRAPHIC) QUADRANGLE MAP OF OMAHA NORTH, NE.–IA., 1994.

2000 1000 0 2000

SCALE IN FEET

May 09, 2000 6:14:09 a.m.
Drawing: T:\91MC204\FIG-1.DWG (DAP)
Xrefs: uprrpropline2.DWG

OMAHA SHOPS LOCATION

OMAHA SHOPS
UNION PACIFIC RAILROAD COMPANY

URS Greiner Woodward Clyde

DRN BY DAP	DATE 12/15/99	PROJECT NO. 45-091MC204.02	FIG. NO. 1-1
CHK'D BY .	REVISION .		

2.1 PROJECT ORGANIZATION

The organizational structure and responsibilities of key personnel are designed to assure adequate project control and quality for the CMI. Health and safety key personnel and their responsibilities are detailed in the Health and Safety Plan (HSP).

URS Corporation (URS) will assign a CMI construction manager whose responsibilities will include evaluation and selection of contractors and suppliers, engineering, quality control testing, and other technical field support during construction. UPRR will approve all contractors and suppliers for the CMI construction. The organization chart in Figure 2-1 shows the lines of communication and authority during the CMI construction.

2.2 KEY PERSONNEL

The following key personnel have been identified for the implementation of this CQA/QCP:

- UPRR Project Coordinator (PC): Jeff McDermott
- URS Project Manager (PM): Jeff Smith
- URS Construction Quality Assurance Officer (CQAO): John Heinicke
- URS Site Manager (SM): Chris Poulsen
- Field QC: Staff

2.3 RESPONSIBILITIES AND AUTHORITIES OF KEY PERSONNEL

The responsibilities and authorities of key personnel involved with the CMI are described below.

2.3.1 UPRR Project Coordinator

The UPRR Project Coordinator (PC), or the designated Alternate PC, will oversee all aspects of work required by the Order and will serve as the main point of contact to USEPA and NDEQ. The UPRR PC is responsible for submitting quarterly progress reports to the USEPA and NDEQ, and is also responsible for submitting the Construction Completion Report to the USEPA and NDEQ. The UPRR PC maintains approval authority for all contractors and suppliers used to construct the CMI.

2.3.2 URS Project Manager

The URS Project Manager (PM) has the primary responsibility for completing the project so that all work meets quality objectives, budget, and schedule. The PM is the main point of contact between the URS team and UPRR's PC. The PM is responsible for overall coordination within the URS team and assignment of project activities to URS team members.

2.3.3 URS Construction Quality Assurance Officer

The Construction Quality Assurance Officer (CQAO) reports to the URS PM and works directly with the PM and other members of the URS team. The CQAO has the following responsibilities:

- Monitor and verify that work is completed in conformance with this CQA/QCP and other applicable project design, documents, drawings, and specifications
- Assess the effectiveness of the QA/QC program and recommend modifications to the program if deemed applicable
- Verify that QA/QC personnel assigned to the project are trained and indoctrinated relative to the requirements of the QA/QC program
- Review and verify the disposition of nonconformance and corrective measures
- Conduct periodic QA audits

Although the CQAO advises and reports to the URS PM, the CQAO will function independent of the URS PM in implementation of the QA/QC program. The CQAO has the authority to stop work in case of nonconformance with the CQA/QCP or if problems are not corrected in a timely manner.

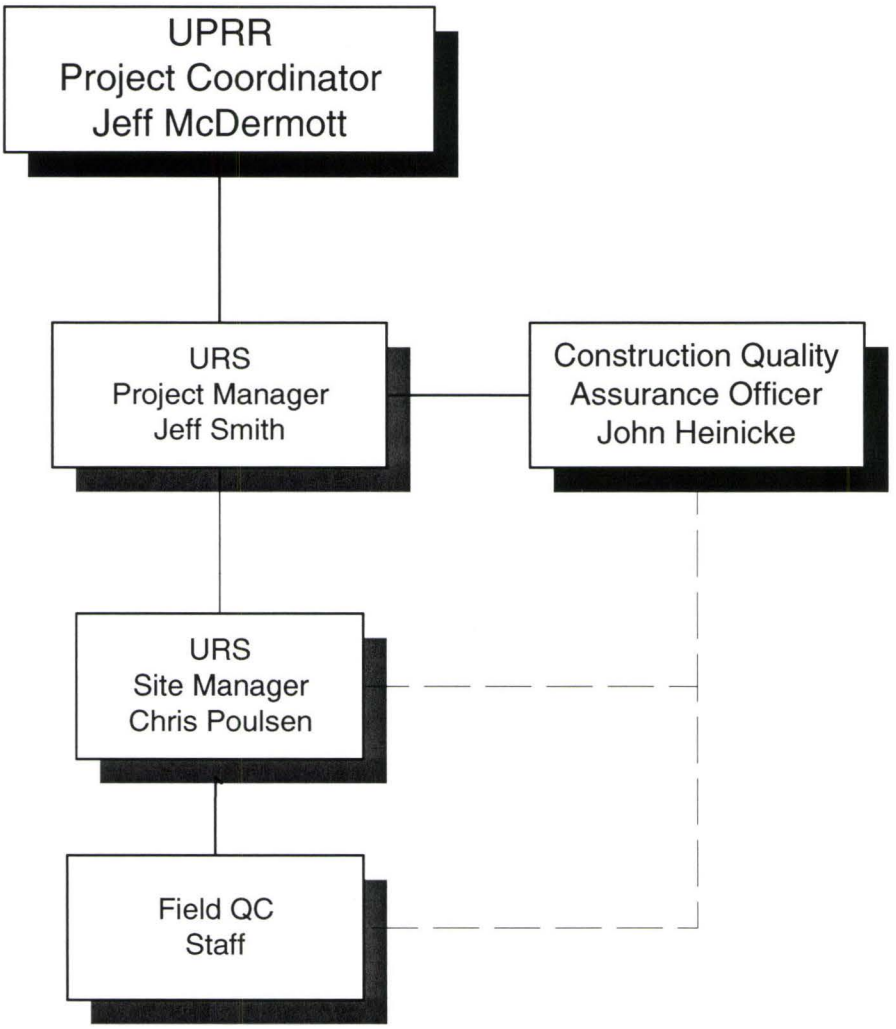
2.3.4 URS Site Manager

The URS Site Manager (SM) reports to the PM and is responsible for assuring that sufficient QC and record data are obtained to prepare the record drawings and Construction Completion Report. The SM has the following responsibilities:

- Monitor daily construction progress, observe and test some work, and complete daily progress reports
- Coordinate on-site QC activities between the QC Field Team and the contractor, and maintain an on-site record of QC activities throughout the construction period
- Communicate proposed modifications of the approved design documents to the PM, coordinate approved modifications with the contractor, and record approved modifications for incorporation into record drawings
- Monitor and assure compliance with construction safety protocols specified in the HSP
- Monitor and assure compliance with the procedures established in the Contingency Plan.
- Oversee the evaluation of contractor and supplier qualifications, including review and approval of contractor and supplier submittals
- Oversee and monitor construction scheduling, cost, and completion of work
- Complete regular site visits during construction
- Review and maintain a record of QC field reports and construction meetings
- Develop record drawings and Construction Completion Report

2.3.5 Field QC Staff

Each member of the field QC staff reports to the URS SM and is responsible for completion of their assigned construction observation, testing, and reporting. Members of the QC staff are responsible for understanding and implementing the provisions of the CQA/QCP as it applies to their individual activities.



ENVIRONMENTAL MANAGEMENT

URS

PROJECT ORGANIZATIONAL CHART
UPRR OMAHA SHOPS - OMAHA, NEBRASKA

DRN. BY: jdg	DATE: 07/25/00	PROJECT NO.	FIG. NO.
CHK'D. BY:	DATE:	45-091MC204.02	2-1

q:\91mc20~2\ou1cmi~1\cqap_f21.vsd 7/25/00 8:34 AM (jdg) (1 of 1)

This section describes the protocols that will be used to monitor construction activities, including scheduled project meetings and QC observation and testing. Procedures for resolving construction discrepancies and for quality assurance audits are also described in this section.

3.1 PROJECT MEETINGS

Meetings will be scheduled throughout the project to enhance communication between responsible personnel. Project meetings will be documented by a member of the URS team, and meeting notes will be distributed to all responsible personnel. Meeting documentation will include the meeting attendees, agenda, and action items.

3.1.1 Preconstruction Meetings

A preconstruction meeting will be held prior to the start of construction activities. The purpose of the meeting will be to:

- Review responsibilities, authorities, and lines of communication between each organization
- Review methods for documenting and reporting inspection data
- Review methods for distributing and storing documents and reports
- Review work area security and safety protocol
- Discuss any appropriate modifications to the CQA/QCP to ensure that site-specific considerations are addressed
- Conduct a site walk-around to verify that the design criteria, plans, and specifications are understood and to review equipment and materials storage locations

URS's PM will prepare and distribute meeting notes.

3.1.2 Weekly Construction Progress Meetings

URS's SM, appropriate QC field staff, and the contractor's superintendent will meet weekly to discuss issues regarding quality, schedule, and cost. These meetings will be held to expedite the identification of potential problems and to develop rapid solutions. Other participants in the CMI will attend these meetings, as needed.

Specific agenda items to be covered by the weekly construction progress meetings include:

- Review work locations and activities for the upcoming week
- Identify contractor's personnel and equipment assignments for the upcoming week
- Discuss potential construction problems

Meetings will be held more frequently if necessary to coordinate work activities between subcontractors or to address special problems or questions. URS's SM will prepare and distribute meeting notes.

3.1.3 Problem or Work Deficiency Meetings

Special meetings will be held when a problem or work deficiency is present or appears likely to occur. At a minimum, URS's SM and the contractor's superintendent or foreman will attend this meeting. Others will be alerted depending on the problems or deficiencies and invited to participate in the meeting.

Specific agenda items to be covered by a problem or work deficiency meeting include:

- Define the problem or deficiency
- Discuss alternative solutions
- Develop a plan and schedule to resolve the problem or deficiency

URS's SM will prepare and distribute meeting notes.

3.2 GENERAL QC ACTIVITIES

URS's SM and QC field staff will observe, test, and document construction activities. The SM and field staff will review appropriate site information to familiarize themselves with the expected site conditions upon which the design was based. Construction QC will be based on a three-step system (preconstruction, construction, and postconstruction) as described generally below.

3.2.1 Preconstruction

Preconstruction activities will include obtaining appropriate construction permits, reviewing shop drawings and submittals for conformance with specifications, checking delivered materials against approved materials, and examining work areas in advance of work.

3.2.1.1 Construction Permits

The specifications will hold the contractor responsible for securing construction permits related to the contractor's work. Examples of construction permits would include a grading permit, storm water discharge permit, electrical permit, and street construction permit. URS's SM will obtain copies of construction permits and maintain a construction permit file on site.

3.2.1.2 Shop Drawings and Submittals

URS's SM will be responsible, in conjunction with appropriate design staff, for reviewing or overseeing the review of shop drawings and submittals. Final approval of shop drawings will be made by SM. The SM will:

- Prepare a submittal register and file. The submittal register will indicate which submittals have been received and the status of each submittal as follows:
  - No exceptions taken
  - Furnish as noted
  - Revise and resubmit

- Maintain an updated construction schedule that includes the schedule for required operational testing and instruction periods

A copy of all approved shop drawings and submittals will be maintained on site by the SM.

3.2.1.3 Material Deliveries, Storage, and Certifications

URS's SM will monitor the receipt of materials at the site to ensure correct material handling and storage to prevent contamination, damage, premature wear, or degradation of useful life. The SM will:

- Check delivered materials for damage that could have occurred before or during shipping to the site, and reject any damaged materials
- Document that materials have been submitted, certified, and/or approved as required by the specifications
- Maintain a file of warranties and certifications

3.2.1.4 Pre-construction Photographs and Surveying

URS's SM will be responsible for examining and photographing all work areas before construction begins in any area. The SM will coordinate necessary surveying and staking. Photodocumentation and copies of surveying records will be maintained on site.

3.2.2 Construction

URS's SM will observe contractors procedures, facilities, and equipment. Construction QC will be discussed at weekly project meetings in advance of the related work. The SM and QC field staff will be responsible for ensuring all activities are carried out in a safe and timely manner. The SM and QC field staff will observe and log all excavation and construction activities. Daily observation and documentation will include:

- Wind speed, wind direction, temperature, and other weather conditions.
- Excavation activities
- Photodocumentation of excavation activities
- Excavation volume
- Analytical results of confirmation sampling
- Air Monitoring data
- Any modification of the excavation due to confirmation sampling
- Placement of excavated material
- Construction activities
- Health and Safety documentation
- Any other unforeseen events

URS's SM will report information to the PM on a daily basis. Problems requiring immediate notification include health and safety violations, contractor disputes, equipment problems, changes in scope, or any other events causing health and safety concerns or delays in activity.

Any changes to the project scope will be communicated to all parties involved including UPRR's PC, SM, QC field staff, the CQAO, and all contractors. Major decisions or changes to the corrective measure will require USEPA notification.

3.2.3 Postconstruction

A postconstruction inspection will be completed by the SM to ensure all construction activities meet or exceed all design criteria, plans, and specifications. URS's SM will be responsible for examining and photographing all work areas after construction is completed.

The SM will document on forms and/or in a logbook, activities associated with the construction of the CMI. Example field report forms are included in Appendix A.

4.1 QC REPORTS

Construction of the CMI components will be monitored and documented on a daily basis by the QC staff. The daily records will include daily reports documenting observations and QC test results; test data sheets; discrepancy reports; and records of conversations, meetings, and correspondence.

4.1.1 Daily Reports

Daily reports documenting QC and construction activities will be filled out. These daily field reports will include:

- Copies of observation and QC test result reports
- Data and calculation sheets
- Other pertinent QC documentation

4.1.2 Other Reporting Forms

Several forms will be used to document QC and construction activities. These forms include:

- Discrepancy Report - This form will be used to report any discrepancies in materials or workmanship and any corrective measures taken. Data from this report will be summarized in the Daily Report.
- Information Request - This form will be used to document any changes being considered. The form will be initiated by the QC staff, contractor, or subcontractor. The SM will transmit the form to the PM for action.
- Field Audit Report - This form will be used by a member of the QC staff when conducting audits.
- Photographic Log - This form will be used to document the date, location, and reason photographs were taken.
- Earthwork Observation Log - This form will be used to document placement of fill and backfill.

4.1.3 Logbooks

Each QC activity and observation will be properly recorded in a logbook to facilitate a timely and accurate reconstruction of the events in the field without relying on the memories of the QC staff. The logbook will be bound with consecutively numbered pages. All entries in the logbooks will be made with waterproof ink and corrections will consist of line-out deletions that are initialed and dated.

The logbooks will be kept in the QC staff member's possession or in a secure place during the CMI. The logbooks will become part of the project file after completion of the CMI.

4.2 FINAL DOCUMENTATION

The final documentation will include:

- Construction Completion Report
- Operations and Maintenance (O&M) Manual

4.2.1 Construction Completion Report

The Construction Completion Report will verify that construction was completed in accordance with the Design Drawings and Specifications. The Construction Completion Report will include:

- Record Drawings signed and stamped by a Professional Engineer registered in the State of Nebraska
- Test results
- Inspection Reports
- Nonconformance and Corrective Action Reports
- Survey data on constructed components
- Statements pertaining to the extent of construction (i.e., depths, plan dimensions, elevations, etc.)
- Material quality summary including quantities used and quantities wasted
- Certification by a Professional Engineer registered in the State of Nebraska
- Other pertinent information
- The following statement, signed by a responsible corporate official of UPRR or UPRR's PC:

  "To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

4.2.2 O&M Manual

A Draft O&M Manual will be prepared during the final phase of the CMI. A Final O&M Manual will be prepared after the final construction inspection. The O&M Manual will include:

- Description of normal operations and maintenance
- Description of potential operating problems
- Description of routine monitoring and laboratory testing

- Description of corrective action to be implemented in the event that performance standards are not achieved
- Description of Safety Plan
- Description of equipment
- Records and reporting mechanisms

4.3 RECORDS STORAGE

A project file containing documentation of the CMI construction activities will be maintained by UPRR. UPRR will maintain the project files per the requirements described in the Order. Project documentation will be checked for completeness to include peer review, calculation checks, and Professional Engineer signatures on drawings and reports where appropriate.

URS

DAILY CONSTRUCTION REPORT

CONTRACTOR _____
PROJECT _____
LOCATION _____
DATE _____
PROJECT NO. _____

DAY	S	M	T	W	T	F	S

WEATHER	CLR	P.LY	CLDY	FOG
TEMP	HIGH	75°F	LOW	89°F
WIND	CALM	MOD	HIGH	
PREC	RAIN	LITE	MOD	HIGH
	SNOW	LITE	MOD	HIGH

EQUIPMENT ON SITE	A/I	EQUIPMENT ON SITE	A/I	EQUIPMENT ON SITE	A/I

SUBCONTRACTORS ON SITE	SUBCONTRACTORS (CONT.)	MATERIAL DELIVERED

SUMMARY OF ACTIVITIES/DISCUSSIONS/DECISIONS

DISTRIBUTION: 1. Project File
2. Project Engineer

OBSERVER _____

URS **FIELD AUDIT REPORT**

FIELD AUDIT NUMBER _____ PROJECT NUMBER _____ DATE _____

PROJECT _____

PROJECT LOCATION _____

AUDITOR NAME _____ AUDITOR TITLE _____

COMMENTS/OBSERVATIONS/PROBLEMS ENCOUNTERED

CORRECTIVE ACTIONS

COMPLETED BY _____ DATE _____

URS

WORK CLARIFICATION

WORK CLARIFICATION NUMBER _____ PROJECT NUMBER _____ DATE _____

PROJECT _____

PROJECT LOCATION _____

TO _____(Contractor)

The following clarification of the Work is issued in response to Contractor's Request for Information (RFI) No. _____, dated _____

Reference _____

Dwg No. _____ Spec'n No. _____ Detail No. _____

DISTRIBUTION:
1. PROJ. MGR.
2. FIELD OFFICE
3. OWNER
4. FILE

SIGNATURE _____ DATE _____

ACKNOWLEDGED _____ DATE _____

URS **DISCREPANCY REPORT**

DISCREPANCY REPORT NO. _____ PROJECT NO. _____ DATE July 25, 2000

PROJECT _____

PROJECT LOCATION _____

TO _____

DESCRIPTION OF DISCREPANCY, NONCONFORMANCE, OR CAUSE

PROPOSED CORRECTIVE ACTION

CORRECTIVE ACTION APPROVED BY _____ DATE _____
URS

COMPLETED BY _____ DATE _____
CONTRACTOR

CHECKED BY _____ DATE _____
URS

DIST:
1. Project Engineer
2. Field Office
3. File
4.

URS **FIELD DIRECTIVE**

DIRECTIVE NUMBER ____ PROJECT NUMBER _____ DATE _____
PROJECT _____
PROJECT LOCATION _____
TO _____

You are hereby directed to effect the following modifications of the contract. If this affects Contract Time or Contract Cost, a formal Change Order will be issued in accordance with the Contract Documents.

Contractor shall keep accurate records of the cost of the work covered by this Field Directive, and shall reference this Field Directive when submitting costs for the Change Order to be issued subsequent to this Field Directive.

DIST:
1. Project Engineer
2. Field Office
3. KSDG
4. File

SIGNATURE _____ DATE _____
URS

ACCEPTED _____ DATE _____
CONTRACTOR

FIELD DIRECTIVE LOG
UNION PACIFIC RAILROAD OAMHA SHOPS
OMAHA, NEBRASKA

FD No.	Date Issued	Description	Change Order No.	Approved By URS	Approved By Subcontractor
1	Jun 8, 2000	Geotextile material order		6/8/00	
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					

URS **REQUEST FOR INFORMATION**

REQUEST NUMBER _____ PROJECT NUMBER _____ DATE _____

PROJECT _____

PROJECT LOCATION _____

TO _____

SUBJECT _____

REFERENCE:

DWG NO. _____ SPEC'N _____ DETAIL _____ OTHER _____

INFORMATION REQUESTED

REQUESTED BY _____ DATE _____

APPROVED BY GENERAL CONTRACTOR _____ DATE _____

REPLY

RESPONSE BY _____ DATE _____

RECEIVED BY _____ DATE _____

DRAFT

CMI HEALTH AND SAFETY PLAN OPERABLE UNIT NO. 1 (OU1)

Omaha Shops

Prepared for
Union Pacific Railroad Company
Omaha, Nebraska

UNION PACIFIC

ENVIRONMENTAL MANAGEMENT

July 2000

URS
101 South 108th Avenue
Omaha, Nebraska

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AOC	Area of Concern
CFR	Code of Federal Regulations
CMI	Corrective Measures Implementation
COPC	Chemical of Potential Concern
CPR	Cardiopulmonary Resuscitation
HEPA	High-Efficiency Particulate Air
HSM	Health and Safety Manager
HSP	Health and Safety Plan
LHCA	Lead Hazard Control Area
Order	Administrative Order on Consent
OSHA	Occupational Safety and Health Administration
OU1	Operable Unit No. 1
PEL	Permissible Exposure Limit
PM	Project Manager
PPE	Personal Protective Equipment
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RHSM	Regional Health and Safety Manager
SHSO	Site Health and Safety Officer
SM	Site Manager
SOP	Standard Operation Procedure
SWMU	Solid Waste Management Unit
TWA	Time-Weighted Average
UPPC	Union Pacific Project Coordinator
UPRR	Union Pacific Railroad
URS	URS Greiner Woodward Clyde
USEPA	United States Environmental Protection Agency
WP	Work Plan

HEALTH AND SAFETY PLAN

UPRR OMAHA SHOPS, INTERIM MEASURES

PROJECT APPROVALS:

Date	Jeff McDermott, UPRR Project Coordinator
Date	Jeff Smith, URS Project Manager
Date	Jeff Hopkins, URS Health & Safety Manager

Effective dates of this Health and Safety Plan: May 1, 2000 through December 31, 2001.

The Union Pacific Railroad Company (UPRR) Omaha Shops are the subject of a United States Environmental Protection Agency (USEPA) Order on Consent (Order) under Section 3008(h) of The Resource Conservation and Recovery Act (RCRA). The Order requires UPRR to complete a Corrective Measures Implementation (CMI) Work Plan (WP) for Operable Unit 1 (OU1). This Health and Safety Plan (HSP) is one component of the CMI Work Plan.

2.1 PURPOSE

This HSP establishes guidelines and requirements for the safety of field personnel conducting field activities associated with the OU1 CMI. Detailed descriptions of the purpose and scope of field activities are presented in the OU1 CMI Work Plan. The field activities addressed by this plan include:

- Excavation of lead-contaminated soils
- Collection of confirmation samples
- Air monitoring
- Construction of soil cover

This HSP establishes the necessary controls, supervision, observations, and monitoring required during CMI field activities. The health and safety guidelines and requirements presented are based on a review of available information and an evaluation of potential hazards. The Standard Operating Procedures (SOPs) attached to this HSP outline the health and safety procedures and equipment required for minimizing the potential for exposures of on-site personnel during field activities. This plan may be modified by the URS Project Manager (PM) with the approval of the URS Health and Safety Manager (HSM) and the URS Regional Health and Safety Manager (RHSM).

All employees of URS involved in this project are required to abide by the provisions of this plan. They are required to read this plan and sign the Compliance Agreement Form (Appendix A) prior to commencement of work activities. Additionally, subcontractors completing soil removal activities are required to follow the safety procedures and guidelines presented in their Site-Specific HSP. The subcontractor's HSP must be reviewed by URS.

2.2 SITE BACKGROUND

URS completed a Phase II Site Assessment (Phase II SA) in 1992 to address soil and groundwater contamination at the Omaha Shops. The USEPA completed RCRA Facility Assessment (RFA) at the Omaha Shops in 1998. URS completed a RCRA Facility Investigation (RFI) for OU1 in June 1999. OU1 included 29 solid waste management units (SWMUs) and 14 areas of concern (AOCs) located in the southern part of the Omaha Shops.

2.3 SITE DESCRIPTION

Descriptions of the site location and geographical setting are presented in Section 2 of the OU1 RFI Report. Summaries of the current conditions including site geology, site hydrogeology, and distribution of released chemicals are also presented in the OU1 RFI Report.

2.4 PAST DATA COLLECTION ACTIVITIES

Site conditions have been described in the following investigation reports:

- Geologic and Hydrologic Investigation of Union Pacific's Omaha Yard and Vicinity, January 1984
- Diesel Recovery Design (Phase I), Union Pacific Rail Yard; Omaha, Nebraska; Terracon, 1988
- Preliminary Site Assessment; Omaha Shops; United States Pollution Control, Inc., 1988
- Site Investigation Report, Omaha Shops and Maintenance Facility Environmental Assessment; HDR Engineering, Inc., 1990
- Phase II Site Assessment, Construction Area, Omaha Shops; Woodward Clyde, 1995
- RCRA Facility Assessment, Union Pacific Railroad; Omaha, Nebraska; Tetra Tech EM Inc., 1998
- RCRA Facility Investigation, Operable Unit No. 1, Omaha Shops, URS Greiner Woodward Clyde; June 1999

3.1 PROJECT ORGANIZATION

The organizational structure and responsibilities of key personnel are designed to assure adequate protection of the health and safety of the on-site personnel from the hazards caused by the field activities. Health and safety responsibilities and authorities are detailed in this HSP.

URS will assign a site health and safety officer (SHSO), whose responsibilities will include evaluation of health and safety procedures and monitoring during all intrusive activities.

3.2 KEY PERSONNEL

The following key personnel have been identified for the implementation and monitoring of this HSP:

- UPRR Project Coordinator (UPPC): Jeff McDermott, (402) 271-3675
- URS Project Manager (PM): Jeff Smith, (402) 334-8181
- URS Site Manager (SM): Chris Poulsen, (402) 334-8181
- URS Regional Health and Safety Manager (RHSM): Carla Dods, (913) 344-1000
- URS Health and Safety Manager (HSM): Jeff Hopkins, (402) 334-8181
- URS Site Health and Safety Officer (SHSO): John Carson, (402) 334-8181

3.3 RESPONSIBILITIES

3.3.1 URS Project Manager

The URS PM has primary responsibility for completing this phase of the project so that all work meets the quality objectives, budget, and schedule. The PM is the main point of contact between UPRR and the URS project team. The PM is responsible for overall coordination within the URS project team and assignment of project activities to URS team members. The PM is responsible for health and safety on their project.

3.3.2 URS Regional Health and Safety Manager

The URS RHSM has the following responsibilities:

- Direct the implementation of the Health and Safety Program in their responsibility area
- Determine need for project HSP
- Maintain a high level of understanding regarding health and safety regulations regarding the chemicals of potential concern (COPCs)
- Monitor implementation of HSP
- Investigate reports of incidents or accidents

- Provide employee health and safety training, particularly refresher training
- Determine whether an accidental exposure or injury merits a change in the affected individual's work assignments and whether changes in work practices are required

The URS RHSM has the authority to take the following actions:

- Approve or disapprove HSP
- Direct preparation of project HSP
- Access and review project files
- Direct changes in personnel work practices to improve health and safety of employees
- Remove individuals from projects, if their conduct jeopardizes their health and safety or that of coworkers
- Suspend work on any project that jeopardizes the health and safety of personnel involved

3.3.3 URS Health and Safety Manager

The URS HSM has the following responsibilities:

- Maintain a working understanding of key government health and safety regulations and URS health and safety policies
- Assist project managers in matters of health and safety
- Report to RHSM on health and safety matters
- Develop or review, approve or disapprove project HSP prior to submittal to the RHSM for review
- Conduct staff training and orientation on health and safely-related activities
- Appoint or approve SHSO
- Monitor compliance with HSP and conduct site audits
- Assist personnel working at the site with regard to medical examinations and health and safety training
- Answer employee questions and concerns regarding health and safety

The URS HSM has the authority to take the following actions:

- Suspend work or otherwise limit exposures to personnel, if health and safety risks are unacceptable
- Direct personnel to change work practices, if existing practices are deemed to be hazardous to health and safety of personnel
- Remove personnel from projects, if their actions or conditions endanger their health and safety or the health and safety of coworkers

3.3.4 URS Site Health and Safety Officer

The URS SHSO has the following responsibilities:

- Implement the HSP
- Interface with project managers in matters of health and safety
- Report to Site Manager on health and safety matters
- Conduct staff training and orientation on health and safely-related activities
- Monitor compliance with HSP
- Assist personnel working at the site with regard to medical examinations and health and safety training
- Answer employee questions and concerns regarding health and safety

The URS SHSO has the authority to take the following actions:

- Suspend work or otherwise limit exposures to personnel, if health and safety risks are unacceptable
- Direct personnel to change work practices, if existing practices are deemed to be hazardous to health and safety of personnel
- Remove personnel from projects, if their actions or conditions endanger their health and safety or the health and safety of coworkers

4.1 CHEMICAL HAZARDS

Exposure to chemical hazards can present a risk of serious injury. This HSP provides the basis to avoid occupational exposure to chemical hazards by using personal protective equipment (PPE) and work zone monitoring. The SHSO will take any additional measures necessary to avoid exposure to chemical hazards.

The lead-contaminated soil removal and replacement work will comply with applicable laws, ordinances, criteria, rules, and regulations of Federal, State, regional, and local authorities regarding handling, storing, transporting, and disposing of lead waste materials and with the applicable requirements of 29 CFR 1926. Matters of interpretation of standards will be submitted to the appropriate administrative agency for resolution before starting work. Where the requirements of this HSP, the Project Manual, and applicable laws, rules, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirement will apply.

The URS SHSO will be the onsite person responsible for coordination, safety, security, and execution of the work for all URS employees. The URS SHSO will be able to identify existing and predictable lead hazards and will have the authority to take corrective measures to eliminate them. Prior to the start of work, the URS SHSO will instruct each worker as to site-specific project requirements.

The URS SHSO will be responsible for monitoring the air for lead outside the Lead Hazard Control Area (LHCA), which includes the Lead Exclusion Zone and the Lead Decontamination Zone. All soil removal will occur within the LHCA. The Lead Exclusion Zone is the area within 25 feet of where the lead hazard work is occurring, except as prohibited by site boundary conditions. The Lead Exclusion Zone will not require additional perimeter barriers such as fencing, taping or roping.

Work will be performed by competent persons, qualified and trained in the abatement, storage, treatment, hauling, and disposal of lead-containing material and in the subsequent cleanup of the affected environment. Workers will comply with the appropriate Federal, State, and local regulations that mandate training requirements and work practices, and will be capable of performing the work under this contract.

The URS SHSO will assure the following general requirements are met:

- Personnel will wear and utilize protective clothing and equipment as discussed herein.
- Personnel will not be entering the LHCA.
- Personnel of other trades not engaged in lead-containing materials demolition or soil removal activities will not be exposed at any time to airborne concentrations in excess of the lead Action Level.

4.2 PHYSICAL HAZARDS

Physical hazards can involve a risk of serious injury or death. This HSP provides the basis to avoid physical hazards by using PPE and safety SOPs. The SHSO will take any additional measures necessary to alleviate these hazards. This section addresses the general physical and excavation hazards likely to be encountered at this site.

4.2.1 General Physical Hazards

Personnel are expected to perform manual labor tasks and have the potential to strain or otherwise damage their lower back. Personnel shall be instructed on the proper methods for lifting loads in excess of 60 pounds.

Slips, trips, and falls are the most likely accident to be encountered at this site. Good housekeeping is imperative in reducing the potential for slips, trips, and falls and in limiting other safety and health hazards. All personnel involved in the field activities are responsible for practicing good housekeeping on a daily basis.

4.2.2 Excavating Hazards

The hazards involved in excavating are significant and include the hazards of pinch points; entrapment in machinery; impact from moving parts; electrocution from lightning, overhead wires, or buried utilities; and improper operations. Excessive noise is typically generated from excavating. General safety guidelines for excavating activities are attached as SOP HS-204 in Appendix B.

4.2.3 Railroad Hazards

Field activities will be done near active railroad tracks. All work done will conform to UPRR practices (i.e., flagging). On-site personnel and equipment must remain a minimum of 25 feet from the nearest railroad track centerline. Eye, ear, and head protection must be worn when trains are operating. An orange safety vest will be worn by all personnel.

Crossing of railroad tracks will be coordinated with railroad personnel if locomotives or railcars are present. Personnel are not allowed to travel between locomotives or railcars that are connected together. Personnel will not cross a railroad track at a switch. Crossing of railroad tacks will be done with extreme caution because track areas are slippery when wet.

4.2.4 Noise Hazards

Hearing protection devices are required if workers must resort to yelling or raising their voices to be heard above the equipment noise. Both temporary and permanent hearing loss could potentially result from repeated exposure to excessively noisy operations. A copy of SOP No. HS-212 - Noise/Hearing Conservation is included in Appendix B.

4.2.5 Electrical Hazards

During excavation activities, the potential of exposure to electrical hazards exists both below ground and overhead.

A copy of SOP No. HS-206 - Electrical Safety is included in Appendix B.

4.2.6 Signs, Barricades, Barriers, and Flagging

Signs, barricades, barriers, and flagging will be used to identify hazardous areas and to protect field personnel and the public from the hazards. Caution tape shall be placed around the exclusion zone when drilling and trenching/excavating activities are completed in public access areas. Traffic cones and/or traffic barricades will be used when field activities are being done near public roads. Barricades or fencing will be used to identify and protect field personnel and the public from hazards associated with open trenches or excavations.

4.2.7 Severe Weather

All personnel completing any of the field activities are responsible to help monitor for severe weather conditions by obtaining the daily weather forecast and making visual observations. The SHSO should suspend all field activities if severe weather approaches. Additionally, all field activities must be postponed at the first sign of lightning.

4.3 ENVIRONMENTAL HAZARDS

Environmental factors (i.e. insects, animals, and irritant plants) pose a hazard when working outdoors. The SHSO will take all necessary measures to alleviate these hazards. Heat and cold stress are the two most prominent environmental hazards.

4.3.1 Biological Hazards

Personnel may be exposed to biological hazards (i.e., poison ivy, poison oak, ticks, wasps, snakes, and small animals). Personnel will avoid contact with poisonous plants, insects, and small animals (including household pets).

4.3.2 Heat Stress

Warm ambient temperature can result in heat stress. Working in warm ambient temperature can involve a high risk of serious injury or death. A copy of SOP No. HS-201 - Heat Stress is included in Appendix B.

4.3.3 Cold Stress

Cold ambient temperature can result in cold stress. Working in cold ambient temperature can involve a high risk of serious injury or death. A copy of SOP No. HS-202 - Cold Stress is included in Appendix B.

4.3.4 Urban Hazards

The project site is located near many empty buildings in Downtown Omaha. Vagrants live at and near the site.

TABLE 4-1

CHEMICAL HAZARDS EVALUATION FOR SOIL
UPRR OMAHA SHOPS

Chemical Name	Highest Detected Concentration (mg/kg)	Permissible Exposure Limit (ppm)	IDLH (ppm)	Route of Entry	Symptoms	Ionization Potential (eV)
1,2,4-Trimethylbenzene	20.3	25	N.D.	Inhalation, Ingestion, Contact	Eye irrit., resp, dizz, naus	8.27
1,3,5-Trimethylbenzene	7.9	25	N.D.	Inhalation, Ingestion, Contact	Eye irrit., resp, dizz, naus	8.39
Isopropylbenzene	1.3	50	900	Inhalation, Absorption, Ingestion, Contact	Eye irrit., skin, narco	8.75
Methylene chloride	0.0	25	2300	Inhalation, Absorption, Ingestion, Contact	Eye irrit., derm, naus	11.32
Naphthalene	25.0	10	250	Inhalation, Absorption, Ingestion, Contact	Eye irrit., conf, naus	8.12
Tetrachloroethene	2.2	100	150	Inhalation, Absorption, Ingestion, Contact	Eye irrit., naus, flush	9.32
Xylenes	9.2	100	900	Inhalation, Absorption, Ingestion, Contact	Eye irrit., dizz, naus	8.56

N.D. = IDLH has not been determined

The purpose of site control is to minimize potential contamination of workers and protect the public from the hazards associated with field activities.

5.1 EXCESSIVE LEAD LEVELS IN AIR

The Contractor will stop lead hazard abatement work immediately for any of the following conditions:

- Visible dust is observed migrating from the LHCA and beyond the perimeter fence
- Measured airborne lead concentrations collected during lead hazard abatement activities exceed the background airborne concentration levels determined during baseline sampling
- An environmental concentration of 0.03 mg/m^3 expressed as an 8-hour time-weighted average (TWA) outside of the LHCA or at its downwind perimeter

The Subcontractor will then implement additional engineering controls and/or work practice controls to reduce airborne particulate levels. The SM will document corrective actions taken by the Subcontractor. Work will not restart until authorized by the SM.

5.2 DESIGNATION OF WORK ZONES

When work is being done in public access areas, the exclusion zone will be clearly identified with caution tape to help minimize unauthorized intrusion. Additionally, equipment decontamination areas will also be marked with caution tape to help minimize unauthorized intrusion. If unauthorized persons enter an exclusion zone or decontamination area, the field activities shall be stopped immediately, and shall not resume until all unauthorized persons have exited the delineated area. Only authorized personnel will be allowed into the LHCA. Personnel authorized to enter the LHCA will be trained, medically evaluated, and capable of wearing the PPE as required by the subcontractor's HSP.

5.3 FIELD LOGBOOK

The URS SHSO will keep a Field Logbook documenting names of all persons working in the exclusion zone, PPE level being utilized, and the type and frequency of air monitoring.

This section addresses the various levels of PPE that are or may be required at this job site. The primary objective of PPE is to ensure personnel protection and to prevent personnel exposure to site contaminants during work activities.

The URS SHSO will select the required PPE to be used. URS's CIH will periodically review the Contractor's selected PPE to evaluate whether the PPE is being used correctly. The selected PPE will be required to meet the specifications of this HSP and the Project Manual.

6.1 ANTICIPATED PROTECTION LEVELS

All work is expected to be done in Level D, unless it is necessary for personnel to enter the LHCA. Personnel will wear PPE that is appropriate based on preliminary exposure determinations by the subcontractor.

6.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

This section lists the minimum requirements for each protection level. A copy of the following SOP No. HS-304 – Selection and Use of Personal Protective Equipment is included in Appendix B.

6.2.1 Level D

- Level D consists of the following:
- Safety glasses with side shields or goggles (as required by OSHA)
- Hard hat (when working around heavy equipment or overhead hazards)
- Steel toe and shank work boots
- Work clothing as prescribed by the weather
- Hearing protection (if needed)
- Latex or nitrile gloves (when handling soil or groundwater within the LHCA)

6.2.2 Level C

- Level C consists of the following:
- Half-face, air purifying respirator with combination cartridges (MSA, GMC-H or equivalent)
- Steel toe and shank work boots
- Work clothing as prescribed by the weather
- Hearing protection (if needed)
- Latex or nitrile gloves (when handling soil or groundwater within the LHCA)

6.2.3 Respirators

Respirators will be selected and used in accordance with manufacturer's recommendations and will be approved by NIOSH for use in environments containing airborne lead particulate. Personnel will be provided with approved respirators that are fully protective of the worker at the measured or anticipated airborne lead concentration level to be encountered. For Air-Purifying Respirators, the particulate filter portion of the cartridges or canister approved for use in airborne lead environments will be a High-Efficiency Particulate Air (HEPA) filter.

The URS SHSO will upgrade or downgrade the respirator type, based on the anticipated airborne lead particulate concentrations to be encountered. All recommendations made by the URS SHSO to downgrade respirator type will be submitted in writing to URS's CIH for acceptance. Respiratory protection will adhere to the following criteria:

- Respiratory protection will comply with the 29 CFR 1926 and 29 CFR 1910.134.
- A qualitative or quantitative fit test conforming to 29 CFR 1926.1101, Appendix C and Section 1926.62 will be:
  - Performed by the Contractor for each of the Contractor's workers required to wear a respirator
  - Performed for each worker prior to initially wearing a respirator on this project
- Functional fit checks will be performed by employees each time a respirator is put on, in accordance with the manufacturer's recommendation

Used cartridges or canisters will be handled as follows:

- Cartridges or canisters will be disposed of at the conclusion of each work shift
- When wet decontamination is used, cartridges or canisters will be disposed of during each decontamination activity
- All cartridges and canisters will be disposed of in a container which is designated to receive only the cartridges and canisters
- Any change in disposal frequency and the decision logic for this change will be provided by the URS SHSO to URS's CIH for approval

A copy of the following SOPs is included in Appendix B:

- SOP No. HS-301 - Selection and Use of Respiratory Protection Equipment
- SOP No. HS-302 - Respirator Fit Testing
- SOP No. HS-303 - Respirator Inspection, Care, Maintenance, and Storage

6.2.4 Notification Requirements

The Contractor will stop work immediately and notify the URS PM if area sample results indicate ambient air lead above the action level of 0.3 mg/m^3. The Contractor will then

implement additional engineering controls and/or work practice controls to reduce airborne particulate levels below these prescribed limits in the work area. Work will not restart until authorized by the URS SM.

7.1 PERSONAL DECONTAMINATION PROCEDURES

When personnel enter the LHCA, the following decontamination protocols will be followed:

7.1.1 Level C Decontamination

1. Proceed directly to the Decontamination Area located immediately outside the LHCA or next to a defined corridor from the LHCA.
2. Wipe off impermeable gloves.
3. Wipe down the exterior of respirators using wet wipes. Dispose of wet wipes with respirator cartridges/canisters in a segregated container.
4. For foot covering:
   - Wipe down or dispose of boot covers, or
   - Wipe down and bag deconnable boots, or
   - Remove and bag leather boots for reuse only on-site.
5. Remove respirator cartridge/filter for disposal in a segregated container (i.e., respirators only).
6. Remove respirator harness and place in bag for washing.
7. Put soap and water solution in the bag and shake the respirator in the solution.
8. Remove the respirator harness and rinse with clear water.
9. Dry the respirator harness.
10. Bag and store the respirator harness for reuse.
11. Wash hands and face.

7.1.2 Level D Decontamination

1. Remove protective clothing and place in an approved impermeable bag or container.
2. Wash hands and face with soap and rinse with water.
3. If disposable protective coveralls are not used, change to clean clothes prior to leaving the physical boundary designated around the LHCA.

7.2 PERSONAL HYGIENE

At a minimum, personnel must wipe hands, arms, neck, and face with a moistened towel before eating, smoking, or drinking. Personnel will also shower as soon as possible at the end of the workday.

8.1 SAMPLING EQUIPMENT

URS's CIH will approve all air monitoring equipment to be used for evaluation of airborne lead particulate concentrations. The equipment will include, but not be limited to:

- High-volume sampling pumps that can be calibrated and operated at a constant airflow up to approximately 10 liters per minute when equipped with a sampling train of tubing and filter cassette
- Low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to approximately 3.5 liters per minute when equipped with a sampling train of tubing and filter cassette, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps will also be equipped with an automatic flow control unit that will maintain a constant flow even as filter resistance increases due to accumulation of particulate and debris on the filter surface.
- Standard 37-millimeter diameter, 0.8 micron pore size, mixed cellulose ester membrane filters and cassettes.
- A flow calibrator capable of calibration to within plus or minus 2 percent of reading over a temperature range of minus 4 degrees Fahrenheit to plus 140 degrees Fahrenheit and traceable to a National Institute for Standards and Technology primary standard.

8.1.1 Sampling Prior to Lead Abatement Work

The baseline air sampling will be established one week prior to the lead-containing soil removal. The baseline air sampling will be used to establish site-specific background levels of lead in air. Baseline samples will be collected immediately outside the LHCA at the following locations:

- One upwind of the LHCA.
- Two downwind of the LHCA.

8.1.2 Sampling During Soil Removal

Air samples will be collected on a daily basis during lead hazard work. The samples will be collected at the following locations:

- Two samples immediately upwind of the LHCA
- Two samples immediately downwind of the LHCA

8.2 EXPOSURE DETERMINATION

The Contractor will initially determine if any employee may be exposed to lead at or above the Action Level. An employee exposure is that exposure that would occur if the employee were not using a respirator during project operations. Such operations for this project include:

- Where lead-containing soils are present and subject to removal
- Where the Contractor has any reason to believe that an employee performing the task may be exposed to lead in excess of the Permissible Exposure Limit (PEL), until the Contractor performs an employee exposure assessment.

Until the Contractor performs an employee exposure assessment and documents that the employee is not exposed above the PEL, the Contractor will treat the employee as if the employee were exposed above the PEL and will implement the following employee protective measures:

- Appropriate respiratory protection
- Appropriate PPE
- Collection of area air samples.

8.2.1 Initial Determination

The Contractor will monitor employee exposures and will base Initial Determinations on the area air monitoring results and any of the following relevant considerations:

- Area air sample results that would indicate employee exposure to lead
- Previous measurements of airborne lead
- Employee complaints of symptoms that may be attributable to exposure to lead

Symptoms of lead exposure include loss of appetite, metallic taste in the mouth, anxiety, constipation, nausea, pallor, excessive tiredness, weakness, insomnia, headache, nervous irritability, muscle and joint pain or soreness, fine tremors, numbness, dizziness, hyperactivity and colic (abdominal pain).

Measurements of airborne lead made in the preceding 12 months may be used to satisfy the requirement during work operations conducted under work conditions closely resembling, used, and prevailing in the Contractor's current operations. These work conditions include:

- Equipment
- Production
- Process
- Control equipment
- Work practices
- Negative Initial Determination

If the Contractor makes a negative Initial Determination, the Contractor will prepare a written record as follows: *"No employee is exposed to airborne concentrations of lead at or above the Action Level"*, including:

- Date of determination
- Location within the job site
- All Initial Determination exposure monitoring results

8.2.2 Additional Personnel Monitoring

Additional personnel monitoring will be required whenever the Contractor has:

- Any reason to suspect that a changed condition may result in new or additional exposures above the Action Level (0.03 mg/m^3)
- A change has occurred in the following:
  - LHCA Location and Boundaries
  - Equipment
  - Production
  - Process
  - Control equipment
  - Work practices
  - Personnel

Hazardous waste activities will be done at this site. All personnel working at the site will be informed of all potential hazards at the site.

9.1 HAZARDOUS WASTE TRAINING

The site personnel completing hazardous waste activities will be required to obtain and provide a certificate attesting to completing training, as required by Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.120, to the SHSO prior to commencing work. Site supervisors will be required to supply documentation indicating that the additional 8-hour supervisors training has been completed.

9.2 FIRST AID/CPR TRAINING

One person on site will possess current certifications in both Cardiopulmonary Resuscitation (CPR) and First Aid.

9.3 SITE SAFETY MEETINGS

A site safety meeting will be held by the SHSO on a weekly basis to review and plan specific health and safety aspects of scheduled work.

All employees of URS involved in hazardous waste activities will participate in a medical surveillance program. Subcontractors are responsible for the medical surveillance program for their personnel. The medical surveillance program shall meet the requirements of OSHA standard 29 CFR 1910.120 and 1910.134.

Illnesses, injuries, and accidents occurring on site will be attended to immediately. The Health and Safety Incident Report Form will be completed and submitted to the HSM within 24 hours of the reported incident for medical treatment and within 5 days for other incidents. A copy of the Health and Safety Incident Report Form is included in SOP No. HS-102 (Appendix B).

Any person who becomes ill or injured in the exclusion zone will be decontaminated as well as possible giving consideration to which risk is greater, the spread of contamination or the health of the individual. Full decontamination will be done if the injury is minor.

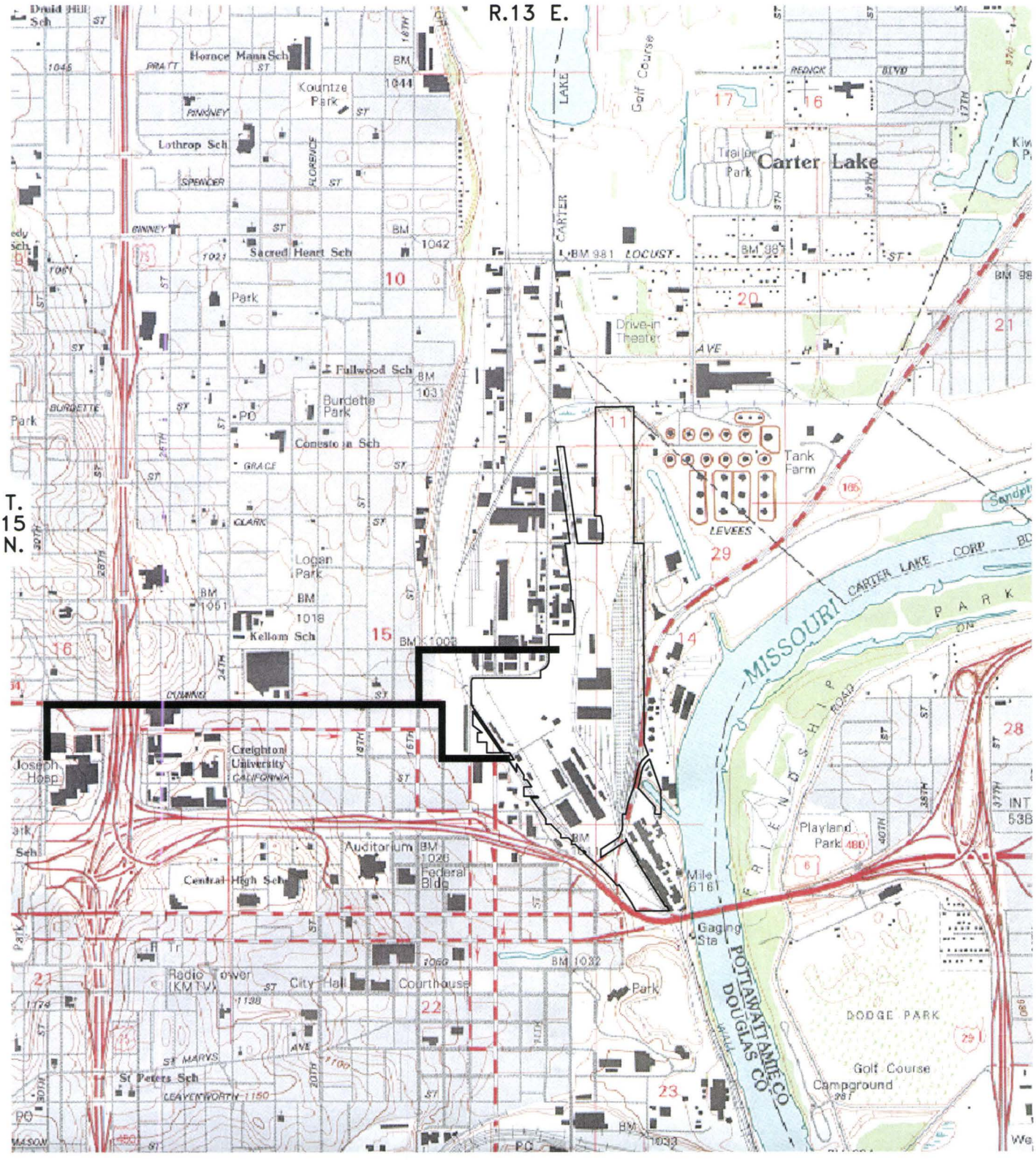
All work activity will cease if emergency personnel have to enter the work area. Appropriate measures to limit any potential emissions of contaminated materials will be initiated. The SHSO will coordinate emergency measures and provide any information or assistance that the emergency personnel may require.

Personnel being transported to the hospital or clinic for treatment will take with them information on the chemical(s) they may have been exposed to and their own medical history.

St. Joseph Hospital
601 North 30th Street
Omaha, Nebraska

A map showing the route to the hospital and a list of emergency phone numbers will be posted at the job site and kept in all vehicles (see Figure 11-1). The emergency phone numbers include:

- Police 911
- Fire 911
- Hospital 449-4000
- Poison Control 1-800-642-9999



NEBRASKA

QUADRANGLE LOCATION

BASE MAP SOURCE: USGS 7.5 MINUTE SERIES (TOPOGRAPHIC) QUADRANGLE MAP OF OMAHA NORTH, NE.–IA., 1994.

N

2000 1000 0 2000

SCALE IN FEET

November 22, 1999 1:59:18 p.m.
Drawing: T:\91MC204\T2100\F11-1_T2100.DWG (DAP)

ROUTE TO HOSPITAL

UNION PACIFIC

ROUTE TO HOSPITAL
UNION PACIFIC RAILROAD COMPANY

URS Greiner Woodward Clyde

DRN BY DAP	DATE 11/22/99	PROJECT NO.	FIG. NO.
CHK'D BY .	REVISION 0	45-091MC204.02	11-1

29 Code of Federal Regulations § 1910.120.

29 Code of Federal Regulations § 1910.134.

Appendix A
Safety Compliance Agreement Form

SAFETY COMPLIANCE AGREEMENT AND
DOCUMENTATION OF SITE SAFETY BRIEFING

DATE _____ TIME _____

SITE LOCATION _____ PROJECT NUMBER _____

SITE SAFETY OFFICER _____ PROJECT MANAGER _____

TOPICS COVERED DURING BRIEFING:
__ EXTENT AND CONCENTRATION OF CHEMICAL HAZARDS ON SITE
__ HEALTH EFFECTS OF CHEMICALS HAZARDS
__ PHYSICAL HAZARDS ON SITE
__ LEVELS OF PROTECTION REQUIRED
__ LOCATION OF EMERGENCY EQUIPMENT(FIRST AID, FIRE FIGHTING EQUIPMENT...)
__ VERICATION THAT HEALTH AND SAFETY PLAN HAS BEEN RECEIVED AND READ
__ MONITORING PROCEDURES
__ ACTION LEVELS
__ DECONTAMINATION PROCEDURES
__ LOCATION OF EMERGENCY NUMBERS
__ ROUTE TO THE HOSPITAL

_____

_____

I, the undersigned, have received a copy of the safety plan for the referenced project. I have read the plan, understand it, and agree to comply with all of the health and safety requirements. I understand that I may be prohibited from working on the project for violating any of the requirements. In addition I have been verbally briefed on the topics noted above.

DOCUMENTION (SSO MUST SEE VERIFICATION BEFORE INITIALLING COLUMN)

ATTENDEES:

NAME	COMPANY	40 HR	FIT	MEDICAL
1.(print) _____				
(signature) _____				
2.(print) _____				
(signature) _____				
3.(print) _____				
(signature) _____				

SAFETY COMPLIANCE AGREEMENT AND DOCUMENTION OF SITE SAFETY BRIEFING - Page 2

I, the undersigned, have received a copy of the safety plan for the referenced project. I have read the plan, understand it, and agree to comply with all of the health and safety requirements. I understand that I may be prohibited from working on the project for violating any of the requirements. In addition I have been verbally briefed on the topics noted above.

DOCUMENTION (SSO MUST SEE VERIFICATION BEFORE INITIALLING COLUMN)

ATTENDEES:

NAME COMPANY	40 HR	FIT	MEDICAL
4.(print) _____ (signature) _____			
5.(print) _____ (signature) _____			
6.(print) _____ (signature) _____			
7.(print) _____ (signature) _____			
8.(print) _____ (signature) _____			
9.(print) _____ (signature) _____			
10.(print) _____ (signature) _____			
11.(print) _____ (signature) _____			
12.(print) _____ (signature) _____			

Appendix B
Operating Procedures

List of Operating Procedures

HS-102	Incident Reports
HS-201	Heat Stress
HS-202	Cold Stress
HS-204	Safety Procedures for Trench Construction and Other Excavating Operations
HS-206	Electrical Safety
HS-212	Noise/Hearing Conservation
HS-301	Selection and Use of Respiratory Protection Equipment
HS-302	Respirator Fit Testing
HS-303	Respirator Inspection, Care, Maintenance, and Storage
HS-304	Selection and Use of Personal Protective Equipment

102.1 PURPOSE

All health and safety incidents shall be reported to URS Corporation (URS) management and health and safety staff. The prompt investigation and reporting of incidents will reduce the risk of future incidents, better protect URS employees, and reduce URS liability.

102.2 DEFINITIONS

A health and safety incident is any event listed below:

- Illness resulting from chemical exposure or suspected chemical exposure.
- Physical injury, including both those that do and do not require medical attention to URS employees or URS subcontractors.
- Fire, explosions, and flashes resulting from activities performed by URS and its subcontractors.
- Property damage resulting from activities performed by URS and its subcontractors.
- Vehicular accidents occurring on site, while traveling to and from client locations, or with any company-owned vehicle.
- Infractions of safety rules and requirements.
- Unexpected chemical exposures.
- Complaints from the public regarding URS field operations.

102.3 REPORTING PROCEDURES

102.3.1 Reporting Format

Incident reports shall be prepared by completing Form HS-102. This form may be obtained from any URS Health and Safety Manager (HSM) and is attached to this operating procedure.

102.3.2 Responsible Party

Reports of incidents occurring in the field shall be prepared by the Site Safety Officer or, in the absence of the site safety officer, the supervising field engineer, witness, or injured/exposed individual.

102.3.3 Filing

A report must be submitted to the Health and Safety Manager of the Operating Unit to which the Project Manager belongs within 24 hours of each incident involving medical treatment. In turn, the Health and Safety Officer must distribute copies of the report to the Corporate Health and Safety Manager and the Regional Health and Safety Manager. When an injury or illness is reported, the Health and Safety Manager must deliver a copy of the report to the individual in charge of Human Resources so that a Worker's Compensation Insurance Report can be filed if

necessary. Reports must be received by Human Resources within 48 hours of each qualifying incident.

102.3.4 Major Incidents

Incidents that include fatalities, hospitalization of employees or subcontractors, or involve injury/illness of the public shall be reported to the HSM and Project Manager as soon as possible. Any contact with the media should be referred to the Project Manager and Operating Unit Manager.

FORM HS-102
Health and Safety Incident Report

Project Name: _____

Project Number: _____

Date of Incident: _____

Time of Incident: _____

Location: _____

TYPE OF INCIDENT
(Check all applicable items)

- ☐ Illness
- ☐ Injury
- ☐ Property Damage
- ☐ Health & Safety Infraction
- ☐ Chemical Spill/Release
- ☐ Fire, Explosion, Flash
- ☐ Unexpected Exposure
- ☐ Vehicular Accident
- ☐ OSHA Recordable Injury/Illness
- ☐ Other (describe) _____

DESCRIPTION OF INCIDENT: (Describe what happened and possible cause. Identify individual involved, witnesses, and their affiliations: and describe emergency or corrective action taken. Attach additional sheets, drawings, or photographs as needed).

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Reporter: _____ _____ _____
Print Name Signature Date

Reporter must deliver this report to the Operating Unit Health & Safety Manager within 24 hours of the reported incident for medical treatment cases and within five days for other incidents.

Corrective Actions Completed: _____ _____
Operating Unit Health & Safety Manager Date

Distribution by HSM:

- Corporate Health and Safety Manager
- Regional Health and Safety Manager
- Project Manager
- Personnel Office (Medical Treatment Cases Only)

201.1 PURPOSE

The purpose of this Operating Procedure is to provide general information on heat stress and the methods that can be utilized to prevent or minimize the occurrence of heat stress.

Adverse climatic conditions are important considerations in planning and conducting site operations. Ambient temperature effects can include physical discomfort, reduced efficiency, personal injury, and increased accident probability. Heat stress is of particular concern while wearing impermeable protective garments, since these garments inhibit evaporative body cooling.

201.2 TYPES OF HEAT STRESS

Heat stress is the combination of environmental and physical work factors that constitute the total heat load imposed on the body. The environmental factors of heat stress are the air temperature, radiant heat exchange, air movement, and water vapor pressure. Physical work contributes to the total heat stress of the job by producing metabolic heat in the body in proportion to the intensity of the work. The amount and type of clothing also affects heat stress.

Heat strain is the series of physiological responses to heat stress. When the strain is excessive for the exposed individual, a feeling of discomfort or distress may result, and, finally, a heat disorder may ensue. The severity of strain will depend not only on the magnitude of the prevailing stress, but also on the age, physical fitness, degree of acclimatization, and dehydration of the worker.

Heat disorder is a general term used to describe one or more of the heat-related disabilities or illnesses shown in Table 201-1.

201.3 METHODS OF CONTROLLING HEAT STRESS

As many of the following control measures, as appropriate, should be utilized to aid in controlling heat stress:

- Provide for adequate liquids to replace lost body fluids. Encourage personnel to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.
- Replace body fluids primarily with water, with commercial mixes such as Gatorade or Quick Kick used only as a portion of the replacement fluids. Avoid excessive use of caffeine drinks such as coffee, colas or tea.
- Establish a work regimen that will provide adequate rest periods for cooling down. The heat exposure Threshold Limit Values (TLV) may be used for guidelines.
- Provide shaded work areas, if possible.
- Wear cooling devices such as vortex tubes or cooling vests.
- Consider adjusting work hours to avoid the worst heat of the day.
- Take breaks in a cool rest area.
- Remove any impermeable protective garments during rest periods.

- Do not assign other tasks to personnel during rest periods.
- Inform personnel of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.

201.4 MONITORING

201.4.1 Temperature

The environmental heat stress of an area can be monitored by the Wet Bulb Globe Temperature Index (WBGT) technique. When heat stress is a possibility, a heat stress monitoring device, such as the Wibget Heat Stress Monitor (Reuter Stokes) can be utilized.

The WBGT shall be compared to the TLV outlined by the American Conference of Governmental Industrial Hygienists (ACGIH) TLV guides, and a work-rest regiment can be established in accordance with the WBGT. Note that approximately 5°C must be subtracted from the TLVs listed for heat stress to compensate for the wearing of impermeable protective clothing.

201.4.2 Medical

In addition to the provisions of the URS medical surveillance program, on-site medical monitoring of personnel should be performed for projects where heat stress is a significant concern. Blood pressure, pulse, body temperature (oral), and body weight loss may be utilized.

Heart Rate: Count the radial pulse during a 30-second period as early as possible in the rest period. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third. If the heart rate still exceeds 110 beats per minute at the next rest cycle, shorten the following work cycle by one-third.

Oral Temperature: Use a clinical thermometer or similar device to measure the oral temperature at the end of the work period (before drinking liquids). If the oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period. If the oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following work cycle by one-third.

Do not permit a worker to wear a semipermeable or impermeable garment if his/her oral temperature exceeds 100.6°F (38.1°C).

Body Water Loss: Measure body weight on a scale accurate to $\pm$0.25 pounds at the beginning and end of each work day (also at lunch break, if possible) to see if enough fluids are being taken to prevent dehydration. Weights should be taken while the employee wears similar clothing or, ideally, nude. The body water loss should not exceed 1.5 percent total body weight loss in a work day.

Physiological Monitoring: Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work. The length of the work cycle will be governed by the frequency of the required physiological monitoring.

201.5 REFERENCES

American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents, 1992-1993.

EPA, Standard Operating Safety Guides, 1992, Pages 91-93.

National Institute for Occupational Safety and Health, Criteria for a Recommended Standard: Occupational Exposure to Hot Environments, 1986.

TABLE 201-1

CLASSIFICATION, MEDICAL ASPECTS, AND PREVENTION OF HEAT ILLNESS

Category and Clinical Features	Predisposing Factors	Underlying Physiological Disturbances	Treatment	Prevention
Temperature Regulation Heatstroke Heatstroke (1) Hot, dry skin; usually red, mottled, or cyanotic; (2) rectal temperature 40.5°C (104°F) and over; (3) confusion, loss of consciousness, convulsions, rectal temperature continues to rise; fatal if treatment is delayed	(1) Sustained exertion in heat by unacclimatized workers; (2) lack of physical fitness and obesity; (3) recent alcohol intake; (4) dehydration; (5) individual susceptibility; and (6) chronic cardiovascular disease	Failure of the central drive for sweating (cause unknown) leading to loss of evaporative cooling and an uncontrolled accelerating rise in temperature; there may be partial rather then complete failure of sweating	Immediate and rapid cooling by immersion in chilled water with massage or by wrapping in wet sheet with vigorous fanning with cool dry air; avoid overcooling; treat shock if present	Medical screening of workers, selection based on health and physical fitness; acclimatization for 5-7 days by graded work and heat exposure; monitoring workers during sustained work in severe heat
Circulatory Hypostasis Heat Syncope Fainting while standing erect and immobile in heat	Lack of acclimatization	Pooling of blood in dilated vessels of skin and lower parts of body	Remove to cooler area; rest in recumbent position; recovery prompt and complete	Acclimatization; intermittent activity to assist venous return to heat
Water and or Salt Depletion (a) Heat Exhaustion (1) Fatigue, nausea, headache, giddiness; (2) skin clammy and moist; complexion pale, muddy, or hectic flush; (3) may faint on standing with rapid thready pulse and low blood pressure; (4) oral temperature normal or low, but rectal temperature usually elevated (37.5-38.5°C or 99.5-101.3°F); water restriction type: urine volume small, highly concentrated; salt restriction type; urine less concentrated chlorides less than 3 g/L	(1) Sustained exertion in heat; (2) lack of acclimatization; and (3) failure to replace water lost in sweat	(1) Dehydration from deficiency of water; (2) depletion of circulating blood volume; (3) circulatory strain from competing demands for blood flow to skin and to active muscles	Remove to cooler environment; rest in recumbent position; administer fluids by mouth; keep at rest until urine volume indicates that water balances have been restored	Acclimatize workers using a breaking-in schedule for 5-7 days; supplement dietary salt only during acclimatization; ample drinking water to be available at all times and to be taken frequently during work day
(b) Heat Cramps Painful spasms of muscles used during work (arms, legs, or abdominal); onset during or after work hours	(1) Heavy sweating during hot work; (2) drinking large volumes of water without replacing salt loss	Loss of body salt in sweat, water intake dilutes electrolytes; water enters muscles, causing spasm	Salted liquids by mouth or more prompt relief by IV infusion	Adequate salt intake with meals; for unacclimatized workers, supplement salt intake at meals.

TABLE 201-1, cont.

CLASSIFICATION, MEDICAL ASPECTS, AND PREVENTION OF HEAT ILLNESS

Category and Clinical Features	Predisposing Factors	Underlying Physiological Disturbances	Treatment	Prevention
Skin Eruptions				
(a) Heat Rash (miliaria rubra, or "prickly heat")				
Profuse tiny raised red vesicles (blisterlike) on affected areas; prickling sensations during heat exposure	Unrelieved exposure to humid heat with skin continuously wet from unevaporated sweat	Plugging of sweat gland ducts with sweat retention and inflammatory reaction	Mild drying lotions; skin cleanliness to prevent infection	Cool sleeping quarters to allow skin to dry between heat exposures
(b) Anhidrotic Heat Exhaustion (miliaria profunda)				
Extensive areas of skin which do not sweat on heat exposure, but present gooseflesh appearance, which subsides with cool environments; associated with incapacitation in heat	Weeks or months of constant exposure to climatic heat with previous history of extensive heat rash and sunburn	Skin trauma (heat rash; sunburn) causes sweat retention deep in skin; reduced evaporative cooling causes heat intolerance	No effective treatment available for anhidrotic areas of skin; recovery of sweating occurs gradually on return to cooler climate	Treat heat rash and avoid further skin trauma by sunburn; provide periodic relief from sustained heat
Behavioral Disorders				
(a) Heat Fatigue - Transient				
Impaired performance of skilled sensorimotor, mental, or vigilance tasks, in heat	Performance decrement greater in unacclimatized and unskilled worker	Discomfort and physiologic strain	Not indicated unless accompanied by other heat illness	Acclimatization and training for work in the heat
(b) Heat Fatigue - Chronic				
Reduced performance capacity; lowering of self-imposed standards of social behavior (e.g., alcoholic over-indulgence); Inability to concentrate, etc.	Workers at risk come from temperature climates for long residence in tropical latitudes	Psychosocial stresses probably as important as heat stress; may involve hormonal imbalance but no positive evidence	Medical treatment for serious causes; speedy relief of symptoms on returning home	Orientation on life in hot regions (customs, climate, living conditions, etc.)

202.1 PURPOSE

The purpose of this Operating Procedure is to provide information on cold stress and the procedures for preventing and dealing with cold stress. Adverse climatic conditions are important considerations in planning and conducting site operations. Ambient temperature effects can include physical discomfort, reduced efficiency, personal injury, and increased accident probability.

202.2 TYPES OF COLD STRESS EFFECTS

202.2.1 Frostbite

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite can be categorized into:

- **Frost Nip or Initial Frostbite**: (1st degree frostbite) Characterized by blanching or whitening of skin.
- **Superficial Frostbite:** (2nd degree frostbite) Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient. Blistering and peeling of the frozen skin will follow exposure.
- **Deep Frostbite:** (3rd degree frostbite) Tissues are cold, pale, and solid; extremely serious injury with possible amputation of affected area.

Frostbite can occur without hypothermia when the extremities do not receive sufficient heat. The toes, fingers, cheeks, and ears are the most commonly affected. Frostbite occurs when there is freezing of the fluids around the cells of the affected tissues. The first symptom of frostbite is an uncomfortable sensation of coldness, followed by numbness. There may be tingling, stinging, or cramping. Contact by the skin with tools or other metal objects below 20°F (-7°C) may result in contact frostbite.

The prevention of frostbite includes early recognition of problems, adequate protective clothing, recognizing the combination of wind and low temperature (see Table 202-1 Windchill Index), adequate fluids, work-rest regimens with heated rest areas, and use of controls such as wind-breaks and heaters.

The initial treatment for frostbite includes bringing the individual to a warm location, removal of clothing in the affected area, and placing the affected parts in warm (100-105°F) water. Do not massage or rub the frostbite area. After the initial treatment, wrap the affected area loosely in sterile gauze and seek medical attention.

202.2.2 Hypothermia

Hypothermia results when the body loses heat faster than it can be produced. When this situation first occurs, blood vessels in the skin constrict in an attempt to conserve vital internal heat. Hands and feet are first affected. If the body continues to lose heat, involuntary shivers begin. This is the body's way of attempting to produce more heat, and it is usually the first real warning sign of hypothermia. Further heat loss produces speech difficulty, confusion, loss of manual

dexterity, collapse, and finally death. Wet clothes or immersion in cold water greatly increases the hypothermia risk. The progressive clinical presentation of hypothermia may be seen in Table 202-2.

Prevention of hypothermia includes planning for outside work in winter conditions, particularly work over water. Planning will include adequate layers of clothing, training employees in recognizing hypothermia in themselves and others, recognition of the combination of wind and temperature (see Windchill Index in Table 202-1), use of controls such as wind-breaks and heaters, a work-rest schedule, and adequate fluid intake.

Fatal exposure to cold among workers has usually resulted from immersion in low temperature water. Water transmits body heat over 200 times faster than air. Wetsuits or drysuits are recommended for work over water with water temperatures below 45°F. Individuals who fall into cold water without wetsuits or drysuits may not be able to swim due to the rapid onset of hypothermia.

Prompt treatment of hypothermia is essential. Once the body temperature drops below 95°F, the loss of temperature control occurs, and the body can no longer rewarm itself. Initial treatment includes reducing heat loss by moving the individual out of the wind and cold, removal of wet clothing, applying external heat (such as a pre-warmed sleeping bag, electric blanket, or body-heat from other workers) and follow-up medical attention.

202.3 EXPOSURE LIMITS

The American Conference of Governmental Industrial Hygienists (ACGIH) has adopted Threshold Limit Values (TLVs) for cold stress. These limits set maximum work periods based on a combination of wind and temperature.

202.4 REFERENCES

American Conference of Governmental Industrial Hygienists, Documentation of Threshold Limit Values, 1984

EPA, Standard Operating Safety Guides, 1992, pages 95-100.

TABLE 202-1

Windchill Index[1]

	ACTUAL THERMOMETER READING (°F)									
	50	40	30	20	10	0	-10	-20	-30	-40
Wind speed in mph	EQUIVALENT TEMPERATURE (°F)									
calm	50	40	30	20	10	0	-10	-20	-30	-40
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-21	-33	-46	-58	-70
15	36	22	9	-5	-18	-36	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-74	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
Over 40 mph (little added effect)	Little Danger (for properly clothed person)				Increasing Danger (Danger from freezing of exposed flesh)			Great Danger		

[1] Source: Fundamentals of Industrial Hygiene, Third Edition. Plog, B.A., Benjamin, G.S., Kerwin, M.A., National Safety Council, 1988.

TABLE 202-2

Progressive Clinical Presentations of Hypothermia*

Core Temperature °C	°F	Clinical Signs
37.6	99.6	"Normal" rectal temperature
37	98.6	"Normal" oral temperature
36	96.8	Metabolic rate increases in an attempt to compensate for heat loss
35	95.0	Maximum shivering
34	93.2	Victim conscious and responsive, with normal blood pressure
33	91.4	Severe hypothermia below this temperature
32 31	89.6 87.8 _	Consciousness clouded; blood pressure becomes difficult to obtain; pupils dilated but react to light; shivering ceases
30 29	86.0 84.2 _	Progressive loss of consciousness; muscular rigidity increases; pulse and blood pressure difficult to obtain; respiratory rate decreases
27	82.4	Ventricular fibrillation possible with myocardial irritability
27	80.6	Voluntary motion ceases; pupils nonreactive to light; deep tendon and superficial reflexes absent
26 25	78.8 77.0	Ventricular fibrillation may occur spontaneously
24	75.2	Pulmonary edema
22 21	71.6 69.8 _	Maximum risk of ventricular fibrillation
20	68.0	Cardiac standstill
18	64.4	Lowest accidental hypothermia victim to recover
17	62.6	Isolectric electroencephalogram
9	48.2	Lowest artificially cooled hypothermia patient to recover

* Presentations approximately related to core temperature. Reprinted from the January 1982 issue of American Family Physician, published by the American Academy of Family Physicians.

204.1 PURPOSE

This procedure contains an overview of the safety requirements for excavating and trenching operations. The requirements are consistent with standards established by the Occupational Safety and Health Administration (OSHA) and described in Title 29 Code of Federal Regulations (CFR) 1926.650. The detailed OSHA standard was effective in January 1990 and should be consulted before design of a shoring system, with questions regarding sloping options, or before working as a "competent person" on an excavation site.

204.2 RESPONSIBILITY

The responsibility and authority for excavating and trenching safety must be well defined prior to project start-up. In general, the contractor will assume responsibility for excavation safety and URS Corporation (URS) will maintain safety responsibility and authority only for URS and URS subcontractor employees. URS employees will not serve in the OSHA defined role of "competent person" unless specifically defined in the project scope of work and approved by the Project Manager (PM) and Management Oversight Reviewer (MOR). The PM shall ensure that the URS field staff clearly understands the limitation of their excavation safety responsibilities and authorities.

URS employees are responsible for understanding the general excavation safety requirements and for not entering improper trenches or excavations.

204.3 APPLICABILITY

This procedure is applicable to all URS projects in which trenching or other excavating operations, exclusive of borings, are entered by URS personnel or personnel employed by firms under contract to URS. It is also applicable to URS projects requiring URS personnel or personnel of firms under contract to URS to enter trenches and other types of excavations.

The best approach for avoiding the detailed trenching requirements is to perform sampling and other procedures without entry into excavations. Use of a backhoe to bring up samples, use of long-handled sampling devices, and similar techniques are recommended.

204.4 REQUIREMENTS

204.4.1 Preliminary Requirements

Certain government agencies (e.g. California) require a permit to perform excavation operations.

Before digging, determine or have the client determine if underground installations, such as sewer, water, fuel, or electrical lines are to be encountered, and if so, determine the exact locations of the lines. Information can be obtained by contacting Underground Service Alert (consult local telephone directory for toll-free number), local utility companies, and the owner of the property on which excavating operations are planned.

Trees, boulders, and other surface encumbrances, located so as to pose a potential hazard to employees must be removed or made safe before the operation begins.

204.4.2 Placement of Excavated Materials

Excavated materials must be placed at least two feet back from the edge of the excavation and precautions must be taken to prevent the materials from falling into the excavation.

204.4.3 Working in Excavations

Shoring and Sloping

Except for solid rock, trenches in which personnel are required to work must be shored or sloped if the depth of the excavation is five (5) feet or more. When a shoring system is used, it shall consist of hydraulic shores or the equivalent, with sheathing or sheet piling as needed. Trench boxes are also permitted. OSHA uses a soil classification system to determine the allowable slopes for trenches. The shoring system must be properly designed and installed to sustain all existing and expected loads. For details on shoring and sloping requirements, consult Title 29 CFR, Subpart P, Sections 1926.650 to 1926.652.

Access

When work is to be performed in any excavation, safe access to the excavation must be provided by means of ladders, stairs, or ramps. Trenches four or more feet deep must have ladders spaced no less than 25 feet apart, and the ladders must extend at least three feet above grade.

Hazardous Atmospheres

At sites where oxygen deficiency or hazardous concentrations of flammable or toxic vapors or gases may be encountered in excavations, the atmosphere in the excavations must be tested by the site safety officer or other qualified person before work in an excavation begins and at appropriate intervals afterward. Trenches may be classified as confined spaces and require an entry permit as covered in HS-205, Confined Space Entry.

204.4.4 Inspection of Excavation

Excavations must be observed daily by the "competent person". If evidence for potential cave-ins or slides is apparent, all work in the excavation must be suspended until necessary steps have been taken to safeguard employees.

204.4.5 Operations of Vehicles Near Excavations

When vehicles or heavy equipment must operate near an excavation, the sides of the excavation must be shored or braced as necessary to withstand forces exerted by the superimposed load and

the earth pressure. Stop logs or other types of secure barriers must be installed at the edges of the excavations.

204.4.6 Bell-Bottom Pier Holes

Employees entering drilled pier holes must be protected by a casing proportioned to sustain the maximum stresses imposed by earth and water or slurry that extends the full depth of the shaft and to the bottom of the bell. A safety cage or a shoulder harness secured to a full-time tended lifeline shall be required for entry and exit. Air monitoring and related requirements of HS-205, Confined Space entry, shall be followed.

204.4.7 Bridges and Walkways

Walkways or bridges with standard guardrails must be provided where employees or equipment are required or permitted to cross over excavations. Pedestrian walkways shall be of sufficient strength to permit a vertical deflection of no more than 0.5 inch when a 250-pound weight is applied to the center of the walkway. All bridges intended for vehicular traffic must be constructed to withstand twice the load of the heaviest vehicle expected.

204.4.8 Barricades and Fences

Excavated areas must be completely guarded on all sides with barricades or fences, as appropriate. If barricades are used, they must be spaced no more than 20 feet apart and shall not be less than 35 inches high when erected. A yellow or yellow and black tape, at least 0.75 inches wide, shall be stretched between the barricades.

204.4.9 Backfilling

Excavated areas must be backfilled in accordance with the work plan as soon as practical after work is completed, and all associated equipment must be removed from the area.

204.5 EXCAVATIONS NEXT TO EXISTING STRUCTURES

A registered engineer will review all plans for excavations next to existing structures to avoid undermining the structures and possible collapse.

206.1 PURPOSE

The purpose of this Operating Procedure (OP) is to reduce the risk of employee injury from electrical shock and to present requirements under 29 CFR 1926, Subpart K and the National Electrical Code (NEC) for employees working with or exposed to electrically energized equipment.

206.2 SCOPE

Employees of URS Corporation (URS) may be exposed to electrical hazards each day. Certain employees design, install, and repair equipment (e.g. vapor extraction units); others provide oversight on construction sites; and many employees spend time in an office setting. Each environment has the potential of exposing employees to electrical hazards.

206.3 DRILLING AND EXCAVATIONS

Electrical hazards may exist on-site and general precautions must be taken to prevent accidental contact with energized sources.

- Overhead lines must be identified and equipment must be kept at least 20 feet from energized lines or any other distance required by local ordinances, whichever is greater. It is important to note that power lines and hoist lines can be moved significantly by wind.
- Drill rigs shall never be moved with the mast erect.
- Underground utilities must be located before drilling or excavating begins. Appropriate utility companies must be contacted before intrusive work begins in accordance with local or state requirements for utility company notification.
- For drilling and excavation at industrial or other locations where underground utilities are owned by the client, as-built drawings of utility locations should be obtained if possible.
- As a general precaution, URS employees shall avoid contact with operating drill rigs or backhoes to reduce the risk of electrical shock should a power line be contacted by the equipment.
- At the first sight of lightning, operations should be stopped and only resumed when conditions permit. Daily weather forecasts should be noted for predictions of electrical storms that may affect field operations.

206.4 HAND TOOLS

- All portable electric hand tools shall be equipped with a three-wire cord having the ground wire permanently connected to the tool frame and means of grounding to the other end. Tools may also be double insulated and labeled as "Double Insulated".
- All circuits shall be protected against overload with protective devices such as fuses, circuit breakers, or ground fault devices.

206.5 OFFICE ELECTRICAL SAFETY

To prevent fire from an overloaded wall plug or extension cord:

- Extension cords must be the right size or rating for the tools and appliances in use.
- Only grounded outlets may be used.
- Outlets should not be overloaded.
- The grounding post may never be removed from a three-prong plug to make it fit into a two prong plug wall outlet.
- Only one adapter may be used for each duplex outlet.
- Ground Fault Interrupters (GFIs) must be installed where electrical appliances or equipment can make contact with water or wet surfaces. Kitchens, bathrooms, and laboratory areas should have GFI devices.
- Switches, fuses, and automatic circuit breakers should be marked, labeled, or arranged for ready identification of circuits or equipment supplied through them.

206.6 CONSTRUCTION SITE REQUIREMENTS

- All installations shall comply with the National Electrical Safety Code (NESC) or the National Electrical Code (NEC).
- All electrical wiring and equipment shall be a type listed by UL, Factory Mutual Engineering Corp., or another recognized test or listing agent for the specific application.
- Ground Fault Interrupters (GFIs) shall be used for all temporary wiring.
- Temporary wiring can be used for up to 90 days if it carries less than 600 V and it is not subject to physical damage.
- Electrical wire or flexible cord passing through work areas shall be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.
- Lamps must be protected from accidental contact or breakage by elevating them 7 feet from the surface or it must have a fixture with guard.
- Equipment, wiring methods, and installation of equipment in hazardous (classified) locations must be intrinsically safe and approved for the location or safe from the hazardous location. Hazardous (classified) location definitions are listed in Table 206-1. Flammable or combustible liquids must be transferred from containers with properly rated pumps and equipment.
- Lockout/Tagout Procedures must be followed where applicable. URS policy is presented in HS-209.
- Specialized lighting and electrical requirements must be implemented for underground construction work under 29 CFR 1926.800.

206.7 GENERAL REQUIREMENTS

- Damaged electrical equipment shall immediately be removed from service and repaired or discarded. Frayed wires, electrical shock, sparks, overheating, physical damage, or other indicators require prompt de-energizing of the circuit or equipment.
- Electrical equipment may not be used unless the manufacturer's name, trademark, or other descriptive marking is placed on the equipment. Other markings shall provide voltage, current, wattage, or other ratings as necessary.
- Live parts of electrical equipment operating at 50 volts or more must be guarded against accidental contact by approved cabinets or enclosures.
- Electrical equipment and lines should always be considered to be energized until determined to be de-energized by tests or other appropriate means. Whenever possible, all equipment, as well as circuits to be worked on, shall be de-energized before work is started and personnel must be protected by clearance procedures and grounding.
- Only competent people shall be allowed to perform electrical maintenance tasks.
- Spliced conductor wires must be joined with splicing devices or soldering.
- All splices and joints and free ends of wires must be covered with insulation equivalent to that on the conductor or by using splicing devices designed for the conductor.
- Each disconnecting means for motors or appliances must be legibly marked to indicate its purpose.
- Sufficient access and working clearance must be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of the equipment. A minimum of 3-foot clearance is required around live parts operating at 600 volts or less. This is applicable to most circuit breaker panels.
- Warning labels spelling "DANGER" must be visible on compartments containing voltage of over 250v AC or DC.
- Extension cords or cables shall not be fastened with staples, hung from nails, or suspended by loose wire.
- Flexible cord must be used only in continuous lengths, without splices, except molded or vulcanized splices may be used when made by a qualified electrician.

206.8 REFERENCES

Subpart S - Electrical, OSHA 29 CFR 1910.

National Electrical Code (NEC) Handbook.

An Illustrated Guide to Electrical Safety, OSHA Publication No. 3073.

NFPA 70E-1988, Electrical Safety Requirements for Employee Workplace.

National Safety Council Data Sheets.

TABLE 206-1

HAZARDOUS LOCATIONS DESIGNATIONS

	Division 1	Division 2
Class I	A location in which ignitable concentrations of flammable gases or vapors may exist under normal operating conditions.	A location in which volatile flammable liquids or flammable gases or vapors are used, but would become hazardous only in case of an accident or some unusual operating condition.
Class II	A location in which the presence of combustible dust exists.	A location where dangerous concentrations of suspended dust would not be likely, but where dust accumulations might form on or in the vicinity of electrical equipment.
Class III	A location where easily ignitable fibers are handled, manufactured, or used.	A location in which easily ignitable fibers are stored or handled, except in process of manufacturing.

212.1 PURPOSE

The purpose of this Operating Procedure (OP) is to establish URS Corporation (URS) procedures and responsibilities for the administration of a hearing conservation program. A proper hearing conservation program will reduce the risk of occupationally induced hearing loss and provide education and guidance for the prevention of "lifestyle" induced hearing loss.

212.2 HAZARD INFORMATION

Excessive noise exposure can cause both temporary and permanent effects on hearing. The temporary effects of excessive noise include ringing in the ears, interference with communication, and hearing threshold changes. The effect of long-term excessive noise includes varying degrees of noise induced hearing loss.

The damaging effects of noise are dependent on the noise intensity (decibels), the time of exposure, the noise frequency (Hertz), and individual susceptibility. The Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs) and American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) set exposure limits based on exposure per day (in hours) and sound intensity (in decibels A scale or dBA). Exposures above these limits require use of hearing protection (plugs or muffs) to reduce the sound level or the use of noise engineering controls to reduce the sound level.

It is known that noise intensity above 85 dBA for prolonged periods will induce hearing loss. Eighty-five dBA represents a noise level where normal conversation is difficult and individuals will be shouting or talking into the ear of the person to be understood.

212.3 REQUIREMENTS

OSHA regulations issued in late 1981 require a hearing conservation program for workers exposed to 85 dBA as an 8-hour time-weighted average.

The OSHA regulation addresses several requirements for a good hearing conservation program. These requirements are as follows:

- Noise exposure monitoring
- Audiometric testing
- Hearing protectors
- Training programs
- Access to information
- Recordkeeping and posting

212.4 RESPONSIBILITIES

Each employee has the responsibility to comply with all aspects of this Operating Procedure. Managers with input from the Health and Safety Officer (HSO)'s and Site Safety Officer (SSO)'s

are responsible for enforcing the provisions of this Operating Procedure as it applies to field work. Scheduling of audiograms (accomplished through Medical Surveillance) and training are the responsibility of the HSO and Corporate Health and Safety Officer (CHSO).

212.5 NOISE EXPOSURE MONITORING

The SSO with assistance from the HSO and/or CHSO will determine when noise monitoring is required for jobs where URS employees are potentially exposed to excessive noise. The SSO/HSO will perform noise monitoring as necessary and make recommendations to assure compliance with Section 212.3 of this Operating Procedure. Engineering controls, ear protection, and posting may be required to comply with Section 212.3. In jobs where URS is working in a client's noisy area, URS personnel will comply with the client's existing hearing conservation program. If a client has a noisy area and has no hearing conservation program, URS will establish a plan for its employees and subcontractors to be in compliance with Section 212.3.

212.6 TRAINING

All workers required to wear hearing protectors will be trained in their proper use. In addition, all workers who may be exposed to greater than 85 dBA will be provided refresher training. This training will include at least the following: (1) Effects of noise on hearing; (2) the purpose, selection, fitting, use and care of hearing protectors; and (3) the purpose of audiometric testing and an explanation of the test procedure.

212.7 HEARING PROTECTORS

When hearing protectors are required the employee must have received training on the proper use. Proper noise reduction ratings will be applied by the HSO/CHSO to the noise in the environment.

Hearing protectors act as barriers to reduce sound entering the ear. Noise Reduction Ratings (NRR) for each product reflects the effectiveness of the protector chosen. Generally, muffs offer a greater NRR (25-30 dBA) than plugs (15-25 dBA). Comfort is an important factor when wearing ear protection over many hours; it is recommended to try different types of plugs or muffs to determine the best combination of comfort and fit.

212.8 AUDIOMETRIC TESTING

Audiograms are administered upon employment and annually/biennially thereafter. The audiograms are conducted by the medical clinics approved for URS physicals and must meet all the applicable requirements (including Appendices C, D, and E of the OSHA Std. Title 29 Code of Federal Regulations (CFR) 1910.95). The local medical clinic in consultation with Greaney Medical will comply with applicable provisions of Title 29 CFR 1910.95(g) with regard to recordkeeping.

212.9 ACCESS TO INFORMATION, RECORDKEEPING

Each office shall have a copy of Title 29 CFR 1910.95 available for any employee requesting access to the standard. Employee training aids shall also be available to any employee. All noise monitoring data shall be retained for at least two years and Greaney Medical shall maintain the audiometric results for thirty years beyond the last date of employment.

301.1 PURPOSE

The purpose of this Operating Procedure (OP) is to provide information for the proper selection of respiratory protection equipment. It is to insure that respirators are properly selected and used in accordance with Occupational Health and Safety Administration (OSHA) requirements. Respirators must be selected on the basis of the hazards to which personnel are or may potentially be exposed.

301.2 REQUIREMENTS

The OSHA standards found in Title 29 of the Code of Federal Regulations, Section 1910.134 establishes requirements for respiratory protection programs, which is summarized in the following eleven major points:

1. Establish Written Operating Procedures - A formal written document outlining aspects of the respiratory protection program must be developed.
2. Respirator Selection - Proper selection of respirators shall be made according to the guidance of American National Standards Institute (ANSI) Z88.2-1980. In choosing respirators, consider the nature and extent of the hazard, the work requirements and conditions, and the characteristics and limitations of the respirators available. When examining the hazardous environment, some of the questions that should be asked are:
   - What are the contaminants?
   - What are their concentrations?
   - Are they gaseous or particulate?
   - Do they have adequate warning properties?
   - Are concentrations immediately dangerous to life or health?
   - Does the air contain at least 19.5 percent oxygen?
   - Are protective clothing and hand protection necessary?
3. Training - Users of respirators should be trained in how to select, use, clean, maintain, and store their respirators. Such training must provide the respirator user with an opportunity to handle the respirator, have it properly fitted, test its facepiece-to-face seal, wear it in normal air for a long familiarity period, and finally, wear it in a test atmosphere. Every respirator wearer must receive fitting instructions, including demonstrations and practice in how to determine if it fits properly.
4. Assign Individual Respirators Where Practical - When respirators are assigned individually, there is less chance that a worker will use one that does not give him or her the best protection. Sometimes it overcomes the unwillingness of an employee to wear a respirator if he or she thinks someone else has used it, and that it was not properly sanitized afterward.
5. Regularly Clean and Sanitize Respirators - There is a three-step method of washing the respirator in a detergent or cleaner-sanitizer, rinsing it in warm water, and air drying it.

6. Respirator Storage - Storing respirators in clean plastic bags or other suitable containers in a clean and sanitary location maintains the integrity of the cleaning and maintenance program.
7. Respirator Inspection and Maintenance - Inspection and maintenance of respirators in accordance with the manufacturer's instructions will ensure that the respirators, when properly used, will give the wearer the best possible protection.
8. Monitor the Work Area - Make sure the right respirator is being used. If there is a change in materials, or processes, in the work area that change the concentration of contaminants, or creates completely different contaminants, changes must be made in the respirator program.
9. Continually Enforce and Evaluate the Respirator Program -No matter how well the written standard operating procedures are drawn up, the program cannot be effective if it is not enforced. Frequent random inspections shall be conducted by a qualified individual to assure that respirators are properly selected, used, cleaned, and maintained. If defects are found, corrective action should be taken.
10. Medical Evaluation of Respirator Wearers - If a potential respirator wearer is not physically able to perform the work using a respirator, the use of a respirator may create more problems than it solves. A physician should be consulted to make sure each respirator wearer is physically qualified.
11. Use Approved or Accepted Respirators - The respirators you use in your work environment must be National Institute of Occupational Safety and Health (NIOSH)/Mine Safety and Health Administration (MSHA) certified, where applicable, or be otherwise accepted to provide adequate protection for the hazards encountered.

301.3 SELECTION

A summary diagram of the respirator selection process is presented in Figure 301-1. It provides an overview of the decision logic that should be used during selection of respiratory protection equipment. A listing of specific decision considerations is presented below.

1. What is the estimated contaminant concentration where the respirator will be used, as determined by industrial hygiene monitoring information.
2. What is the Permissible Exposure Limit (PEL) to the contaminant, Threshold Limit Value (TLV), and Short-Term Exposure Limit (STEL)?

   Health standards for many specific substances are available. OSHA Standard 1910.1000, Tables Z1, Z2, and Z3 gives the required PEL's when no health standards supersede these tables. However, since these tables are established from the 1969 TLV list, good industrial hygiene practice would base respirator selection on current TLV's, if lower, or other new toxicity data.
3. Is the contaminant a gas, vapor, mist, dust or fume? This information can be determined by studying the manufacturing or maintenance process - raw materials, intermediate products, by-products and the wastes. See Material Safety Data Sheets when available.
4. Could the contaminant concentrations be termed Immediately Dangerous to Life or Health (IDLH)?

This knowledge is derived from the manufacturer of raw materials, the process engineer or chemist, the company or plant industrial hygienist, and Material Safety Data Sheets, when available. In addition, consideration should be given to the potential for contamination of atmospheres under abnormal or emergency conditions.

5. If the contaminant is flammable, does the estimated concentration approach the Lower Explosive Limit (LEL), or do dust concentrations create a potential explosion problem?

   Besides creating a potential fire and explosion condition, in most situations flammable vapor or gas concentrations exceeding the LEL are IDLH. Plant gas or vapor levels can be determined with an explosion or combustible gas indicator (CGI). Here, too, consideration should be given to emergency (such as spill) conditions.

6. Does the contaminant have adequate warning properties?

   Manufacturers can supply such information, directly or through Material Safety Data Sheets. Warning properties such as odor, irritation or taste should ideally be present at concentrations at or below the PEL.

7. Will the contaminant irritate the eyes at the estimated concentration?

   Frequently, this will be self-evident if the operation is in progress. This information, too, is available from the Material Safety Data Sheets of raw materials. For irritant materials, a full facepiece respirator should be employed.

8. If the contaminant is a gas or vapor, is there any available sorbent that traps it efficiently?

   Respirator manufacturers and/or industrial hygienists can provide this information.

9. Can the contaminant be absorbed through the skin as a vapor or liquid? If so, will it significantly add to the employee's exposure and cause injury?

   Skin absorption is indicated in the OSHA Standard 1910.1000, Table Z1 by the notation "skin" after the material name. Material Safety Data Sheets will also indicate skin absorption potential.

10. What is the size of the employee's face?

    Some manufacturers offer the same model respirator in two or three sizes. This will help to fit most employees properly with one brand of respirator.

11. What types of respirators will give the required Maximum Use Concentration (MUC)?

    The MUC is a measure of the degree of protection provided by a respirator to a wearer. It takes into account the respirator limitations and the ability of a user to get a satisfactory fit. Multiplying the PEL (or STEL) by the protection factor assigned to a respirator gives the MUC of the hazardous material for which the respirator can be used.

    $$MUC = PEL \times Protection\ Factor$$

    A table of MUCs of various respirators for different contaminants is presented in Table 301-1.

301.4 AIR-PURIFYING RESPIRATORS (APR)

301.4.1 General Considerations and Limitations

- Chemical cartridge respirators shall not be used in environments Immediately Dangerous to Life or Health (IDLH) or in atmospheres containing less than 19.5 percent oxygen.
- Warning Properties of Contaminant - Chemical cartridge respirators shall not be used for exposures to air contaminants that cannot be easily detected by odor or irritations. For example, cartridge respirators should not be used to protect against methyl chloride or hydrogen sulfide. The former is odorless; and the later, while foul smelling, paralyzes the olfactory nerve so quickly that odor detection is unreliable.
- Eye Irritation - When working in environments where concentrations are irritating to the eyes, full facepiece respirators shall be used.
- Chemical cartridge respirators cannot be used for protection against gases that are not effectively stopped by chemical filters utilized; for example, carbon monoxide.

301.4.2 Cartridge Selection

Select the cartridge or cartridge/filter group that best fits the type of exposure. **Using the wrong cartridge and filter may be like using no respirator at all.** For example, acid gas respirators cannot be used for protection against organic vapors. However, an organic vapor-acid gas respirator can be used for one or both of the exposures. Check and recheck the label on the cartridges to make sure the correct ones are issued.

301.4.3 Respirator Use

- After correct cartridges have been selected, screw each cartridge into the facepiece after checking it for intactness; see OP HS-303, Respirator Inspection, Care, Maintenance and Storage. Make sure cartridge seals (usually part of packaging) have been removed.
- Fit the respirator as outlined in OP HS-302, Respirator Fit Testing.
- The cartridges may be used until the odor of the contaminant can be smelled, irritation occurs or the substance can be tasted by the wearer.
- Do not use cartridges after expiration date printed on the label.
- If the facepiece and cartridges are used by one employee and the cartridges are not used until exhaustion, they may be resealed after use, by the employee, and reused at a future time. This may be done until cartridge exhaustion.
- Inspect, clean and maintain respirators as outlined in OP HS-303, Respirator Inspection, Care, Maintenance and Storage.
- Most respirator manufacturers now supply a given model respirator in different sizes so that many employees can be fitted with a single brand of respirator.

301.5 SUPPLIED AIR RESPIRATORS

301.5.1 Self-Contained Breathing Apparatus (SCBA)

The self-contained breathing apparatus affords complete respiratory protection in any atmosphere for which the lungs are the principal route of entry into the body. They supply the wearer with cool, non-contaminated breathing air, as demanded by the wearer, at approximately ambient atmospheric pressure. For specific instructions on SCBA units, consult the SCBA manufacturer's manual.

301.5.1.1 Component Parts

- A cylinder and valve to contain a supply of compressed air.
- A high-pressure, flexible hose that routes the compressed air from the cylinder to the regulator.
- An audible alarm that rings to indicate low cylinder air pressure.
- A pressure-demand regulator that reduces the cylinder pressure to a breathable pressure and supplies the wearer with air in direct response to breathing requirements. All entry or re-entry into immediately dangerous or hazardous atmospheres require the use of a pressure-demand regulator.
- A facepiece assembly consisting of a rubber facepiece and lens, with head band, exhalation valve and breathing tube.
- A carrier and harness on which the cylinder is mounted and by which the entire apparatus is worn.

301.5.1.2 General Check-Out Procedure

A check of the breathing apparatus is very important to ensure its proper operation. Keep records of these inspections. The following should be accomplished:

1. Put on breathing apparatus. Don facepiece.
2. Check its normal regulator cycling under exertion or extremely deep breaths.
3. Check functioning of emergency bypass.
4. Disconnect breathing tube from regulator and place bottom of tube tightly on palm. Inhale to check seal. Reconnect breathing tube.
5. Take off breathing apparatus and close cylinder valve.
6. Observe both gauges to see if they correspond, and check for air leaks in system.
7. Crack emergency bypass or release air from facepiece and slowly reduce air pressure on regulator gauge to determine that the audible alarm activates at the proper pressure.

8. Check:
   - Condition of straps on harness.
   - Tightness of screws and fasteners on:
     - straps
     - regulator bracket
     - all valve handles.
   - Locking devices on:
     - main line valve
     - cylinder valve
     - carrier to secure cylinder.
   - Holes in diaphragm cap on regulator to see if open.
   - Facepiece:
     - should be clean
     - head band in good condition
     - exhalation valve not sticking or held open
     - inhalation valve not sticking or held open
     - speaking diaphragm and gasket in correctly.
9. Gaskets should be in good condition at:
   - Regulator side of breathing tube.
   - Facepiece where breathing tube connects.
   - Speaking diaphragm assembly.
   - O-ring in coupling that connects to cylinder valve.
10. Audible alarm bell cap is tight.
11. All threads in good condition.
12. Hydrostatic test data is current.
13. Cylinder pressure at least 1500 psi, 1800 psi, or 4000 psi, depending on model.
14. Sanitize facepiece as outlined in OP HS-303, Respirator Inspection, Care, Maintenance, and Storage. Return facepiece to plastic bag.

NOTE: If the diaphragm cap is removed to check condition of the diaphragm and level assembly, then this unit must be correctly reassembled to operate properly. If the diaphragm is removed, an operational test of the SCBA must be performed before returning the unit to service.

301.5.2 Air-Line Respirators

The air-line respirator consists of a facepiece to which respirable air is supplied through a small diameter hose. Most units used by URS will be of the pressure-demand type and include an auxiliary (e.g., 5-minute) tank worn by the worker. The advantages of air-line respirators include the high protection factor, minimal breathing resistance, comfort (compared to SCBA's), long work periods (compared to SCBA's), and the lack of limitations associated with APR cartridges.

The air supplied to air-line systems must meet the Compressed Gas Association requirements for Grade D air. Employees setting up air-line systems using air cylinders should ensure that the cylinders are labeled as breathing quality air. If compressors are used as the air supply source, the compressor must be located away and upwind from sources of contamination such as engine exhaust and that the compressor is designed for breathing air supply.

The airflow requirements vary with the manufacturer, but generally include a pressure gauge and regulator at the cylinders, with connecting hose pressures less than 125 psi, and a second regulator at the worker, with the pressure dropped further for entry into the facepiece. The maximum length of connecting hose is 300 ft.

The use of air-line respirators requires proper securing of breathing air cylinders, regular observation of tank pressures to ensure an uninterrupted flow to workers, protection of the connecting hoses, specialized training of employees, and inspection of the equipment according to the specific manufacturers directions.

301.6 WARNINGS RELATED TO RESPIRATOR SELECTION AND USE

1. Failure to properly select the appropriate respirator for all the materials and concentrations to which the respirator wearer may be exposed may result in serious illness, disability, or death of the affected worker.
2. Only self-contained positive pressure breathing apparatus and pressure demand air-line respirators with auxiliary tanks are designed for use in:
   - Oxygen deficient atmospheres (an atmosphere of less than 19.5 percent oxygen by volume at sea level)
   - Poorly ventilated areas, or confined spaces such as tanks, small rooms, tunnels or vessels, unless the confined space is well ventilated and the concentration of toxic contaminants is known to be below the upper limit recommended for the respirator
   - Atmospheres where the concentrations of toxic contaminants are unknown or are IDLH
   - For fire fighting
   - At concentrations of substances higher than the upper limits recommended for air purifying respirators
3. Immediately leave the area and replace the respirator if:
   - Breathing becomes difficult
   - Dizziness or other distress occurs

- You sense irritation, smell or taste the contaminants
- If the respirator becomes damaged

4. The respirator selected must properly fit the wearer. Carefully follow the fitting instructions, fit tests, and fit checks contained in the Instruction Booklet that accompanies each respirator to make certain the respirator fits and operates properly (also see OP HS-302, Respirator Fit Testing).
5. If the worker is exposed to two or more contaminants for which different air-purifying elements are recommended (e.g., ammonia and benzene) and a combination element is not available, then air supplied respirators should be used.
6. Some toxic contaminants are readily absorbed through the skin. In these cases, appropriate gloves and/or protective clothing may be required to protect other areas of the body that might be exposed to the contaminant.
7. Respirators should not be used by individuals with beards, or other facial hair, that passes between the sealing flange of the respirator facepiece and the wearer's face. Facial hair may cause leakage or interfere with the proper operation of the respirator exhalation valve, thereby exposing the wearer to the hazardous contaminants.
8. Air-purifying respirators should not be used for sandblasting or for gas or vapor contaminants with poor warning properties.
9. Any air-purifying respirator, when properly selected and fitted, will significantly reduce, but will not completely eliminate, the breathing of contaminant(s) by the respirator wearer. The wearer, when working in atmospheres containing substances such as asbestos (that are reputed to cause cancer in amounts below their TLV) will obtain better protection from a continuous flow or positive pressure air supplied respirator.

301.7 SPECIAL RESPIRATOR-USE PROBLEMS

301.7.1 Facial Hair

Facial hair lying between the sealing surface of a respirator face piece and the wearer's skin will prevent a good seal. Except with positive pressure air-line respirators, powered air-purifying respirators, and pressure-demand SCBA, a negative pressure exists within the mask upon inhalation; a poor seal will permit contaminated air to enter the facepiece. Even a few days' growth of beard can permit contaminant penetration.

Respirators should not be worn when conditions prevent a good seal of the facepiece to the face. Facial hair in the form of beards, mustaches, sideburns, and stubble should not be permitted on employees required to wear respirators, if the hair comes between the facepiece sealing surface and the face.

301.7.2 Corrective Lenses

Employees wearing corrective eye glasses present a special problem with respect to respiratory protection. Spectacle temple bars, or straps that pass between the sealing surface of a full facepiece respirator and the wearer's face, prevent a good seal and thus must not be worn.

Spectacles with short temple bars that do not interfere with respirator sealing and are taped to the employee's face may be used temporarily. Special corrective lenses or spectacle inserts that can be permanently mounted inside a full facepiece respirator are available from most manufacturers. Such corrective lenses should be mounted in the facepiece such that it ensures good vision and comfort.

Spectacles or goggles may also interfere with quarter or half-mask sealing; in this case a full facepiece respirator should be employed.

Contact lenses shall not be worn while wearing a respirator in a contaminated atmosphere. Contaminants may get into the eyes and cause severe irritation and/or discomfort with quarter or half-masks. Full facepieces can pull at the side of the eye and pop out the lens.

301.7.3 Cold Weather Use of Respirator

Under cold weather conditions a number of problems can develop, such as fogging of full facepiece respirators, valve sticking and rubber stiffness that prevents good facial seal.

Fogging of full facepiece respirators can be eliminated easily by installing a nose-cup into the facepiece. This device, available from most manufacturers, deflects the exhalation breath away from the cold facepiece lens. Defogging solution should also be used.

Other cold weather problems should be discussed with the respirator manufacturer.

301.7.4 Voice Communication

Under some conditions it is necessary for respirator wearers to communicate with other personnel within or outside the contaminated area. When this is necessary, special communicating equipment, generally available from the respirator manufacturer, can be installed inside the facepiece. If penetration of the facepiece or altering of the respirator is in any way necessary to install communications equipment, check with the respirator manufacturer to be sure that the NIOSH/MSHA approval will not be voided by the installation.

301.8 POWERED AIR-PURIFYING RESPIRATORS

Powered air-purifying respirators protect against particulates and/or gases and vapors. The great advantage of the powered air-purifying respirator is that it usually supplies air at a positive pressure so that any leakage is outward from the facepiece. It may be used with a helmet, hood or facepiece. Air can be supplied by a user mounted, battery powered backpack purifier, or by a stationary pump through up to 25 feet of low pressure hose. It has good applicability to abrasive blasting, grinding, pesticide spraying and operations using asbestos.

Generally, powered air-purifying units can be used up to 25 times the PEL for dusts, mists, and fumes, when used with filters that are approved for materials with PELs not less than 0.05 mg/m^3 or 2 mppcf and nuisance dusts. Such respirators can be used up to 25 times the PEL when used with high efficiency filters. For use in chemical vapor or gaseous atmospheres, the MUC depends on the chemical cartridge or canister used. In all cases check the manufacturer's specifications and the NIOSH/MSHA approval for the particular configuration used. Consideration should first be given to standard air-purifying units, supplied air devices and SCBAs.

301.9 DISPOSABLE RESPIRATORY PROTECTION EQUIPMENT

The use of disposable respiratory protection devices eliminates the need to clean, disinfect, inspect and repair equipment. Since the cleaning and maintenance aspects of a respiratory protection program can require time and dollar expenditures, the use of equipment not requiring such services may be desirable in some instances. While the cost of disposable equipment may, in some cases, be higher than comparable reusable devises, this cost may be offset or recoverable by the savings of labor and capital investments for cleaning and inspection facilities.

Disposable chemical vapor or gas respirators might be used economically where limited numbers of this type of respirator are in use or where specific operations are performed infrequently.

301.10 REFERENCES

American Conference of Governmental Industrial Hygienists, TLVs, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices Environment 1992-93, ACGIH, 6500 Glenway Avenue, Building D-5, Cincinnati, Ohio 45211-4438.

Respiratory Protection, A Manual and Guideline, American Industrial Hygiene Association, 1991.

American National Standard, Practices for Respiratory Protection ANSI Z88.2-1980, American National Standards Institute, 1430 Broadway, New York, New York 10018.

National Institute for Occupational Safety and Health, A Guide to Industrial Respiratory Protection, DHHS (NIOSH) Publication 87-116, September 1987, Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

National Institute for Occupational Safety and Health, Occupational Health Guidelines for Chemical Hazards, DHHS (NIOSH) Publication No. 81-123, January 1981, Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

NIOSH/OSHA Pocket Guide to Chemical Hazards, U.S. DHHS (NIOSH), Publication No. 90-117, June 1990.

U.S. Department of Labor, OSHA Safety and Health Standards for General Industry (Title 29 CFR Part 1910), Respiratory Protection 1910.134, U.S. Department of Labor, Occupational Safety and Health Administration, 200 Constitution Avenue, N.W., Washington, DC 20210.

TABLE 301-1

NIOSH RECOMMENDED MAXIMUM USE CONCENTRATIONS (EXPRESSED IN PPM) FOR GAS AND VAPOR AIR-PURIFYING ELEMENTS

	Classification of gas and vapor air-purifying elements		
Type of gas or vapor	**Cartridge(s)**	**Chin-style canister**	**Front- or back-mounted canister**
Organic vapors	1,000*	5,000†	20,000†
Acid gases			
Sulfur dioxide (SO_2)	50	100	100
Chlorine (Cl_2)	10	25	25
Hydrochloric (HCl)	50	100	100
Ammonia (NH_3)	300	500	500
Methyl amine (CH_3NH_2)	100	--	--
Carbon monoxide (CO)	NA	NA	1,500

* Maximum use concentration will be 1,000 ppm or the immediately dangerous to life or health (IDLH) value for the specific organic vapor, whichever is lower.

† Maximum use concentration for "entry into" will be limited to the value listed or to the IDLH value for the specific organic vapor, whichever is lower.

302.1 PURPOSE

The purpose of this Operating Procedure (OP) is to identify and to establish respirator fit testing requirements and procedures.

302.2 REQUIREMENTS

In compliance with Occupational Safety and Health Administration (OSHA) regulation Title 29 Code of Federal Regulations (CFR) 1910.134, all URS Corporation (URS) employees whose job assignments require use of non-powered air-purifying respirators (APR) or air-supplied respirators (ASR) that operate in the demand mode, must be fit tested using the isoamyl acetate (IAA) and/or the irritant smoke (IS) test. Fit tests shall be performed to identify the brand and size of respirator that fits each employee and to facilitate final fitting adjustments in the field.

Fit tests must be recorded for each tested employee. The record shall include test dates and identify the brands, models, and sizes of respirators tested.

302.3 ISOAMYL ACETATE TEST

302.3.1 Isoamyl Acetate Test Equipment

- Isoamyl acetate (USP grade in bottles or in ampules).
- Two bottles for odor recognition testing.
- Test enclosure. A simple test enclosure can be constructed by cutting a small slit at the center of the closed end of a clear plastic bag and inserting the hook of a wire clothes hanger through the slit so that the bag will hang open side down. The bag should be at least 3 mil thick and approximately the size of a garbage bag (large size).

302.3.2 Isoamyl Acetate Testing Procedures

1. The subject must exhibit his/her ability to recognize the odor of IAA. One bottle shall contain water and another, a solution of IAA and water. The subject must be able to discern which bottle contains the IAA solution, thus verifying his/her ability to recognize the odor.
2. The wearer puts on the respirator and adjusts the facepiece and head straps to achieve a snug, but comfortable fit. The positive-negative pressure test (see Section 302.6) should be applied at this point. If the respirator is the air-purifying type, it must be equipped with a fresh cartridge(s) or canister designed to protect against organic vapors.
3. The wearer is exposed to IAA by entering a test enclosure containing IAA vapors. The wearer is exposed first while holding his/her head still. If the wearer does not smell IAA, he/she is exposed again while performing the activities listed in Section 302.5.
4. If the wearer does not smell IAA while active and inactive, a satisfactory fit can be assumed; however, if the wearer smells IAA, he/she readjusts the facepiece and/or headstraps, and Step 2 is repeated.

5. If the wearer continues to smell IAA, an attempt is made to locate the leakage point. If the leakage point cannot be found or corrected, another respirator of the same brand and size is tried. If the respirator leaks, a respirator of another size or brand is tried.

302.4 IRRITANT SMOKE TEST

1. The wearer puts on the respirator and adjusts facepiece and head straps to achieve a snug, but comfortable fit. The positive-negative pressure test (see Section 302.6) should be applied at this point. If the respirator is the air-purifying type, it must be equipped with a HEPA (high efficiency) filter(s).
2. The wearer stands with his/her back towards a fume hood or other ventilation source and is asked to keep his/her eyes closed during the test. (Note: eyes must be closed even when full-face respirators are tested.)
3. With the wearer holding his/her head still, the tester lightly puffs smoke over the facepiece, holding the tube at least 2 feet from it. The volume of smoke should be kept minimal and the wearer's reaction observed between puffs.
4. If the wearer detects no leakage, the tester increases smoke density and moves the tube progressively closer to the wearer, but no closer than 6 inches. If no leakage is detected, exposure is continued while the wearer performs the activities listed in Section 302.5.
5. If no leakage is detected with and without head movements, a satisfactory fit can be assumed. However, if leakage is detected, smoke generation should be stopped and Steps 3 and 4 repeated after the wearer readjusts the facepiece and/or head straps.
6. If a respirator under test continues to leak, another respirator of the same brand, model, and size should be tried. If it does not pass the test, another size or another brand should be tried.

302.5 ACTIVITIES

If, during the IAA or IS test, no leakage occurs while the wearer is holding his/her head still, the test shall be continued while the wearer is instructed to perform the following activities:

1. Deep breathing as in heavy exertion. This activity should not be done long enough to cause hyperventilation.
2. Side-to-side, then up-and-down head movements (exaggerated).
3. Read the "Rainbow Passage." Must be loud enough to be heard by someone standing nearby.

302.6 POSITIVE-NEGATIVE PRESSURE TESTS

These tests can be performed by the wearer alone and requires no special equipment. The tests should be performed only on respirators that have passed the IAA or IS tests and for preliminary fitting during the IAA and IS tests.

In the positive pressure test, the wearer closes off the exhalation valve of the respirator by gently placing his/her palm over the valve and gently exhaling into the facepiece. The fit is considered

satisfactory if a slight pressure builds up in the facepiece without any evidence of outward leakage.

In the negative pressure test, the wearer closes off the inlet of the canister, cartridge(s) or filter(s) with his/her palm or of the breathing tube of a SA respirator by squeezing the tube and inhaling gently so that the facepiece collapses slightly. Breath is held for about 10 seconds. If the facepiece remains slightly collapsed and no inward leakage is detected during the 10-second period, fit may be considered satisfactory.

302.7 TEST FREQUENCY

An IAA and/or IS test must be performed whenever an employee is provided: (1) a respirator for the first time and (2) a replacement respirator of a different brand, model, or size. A test must also be performed whenever: (1) medical records indicate that an employee may have been exposed despite wearing a respirator and (2) an employee complains of having a faulty respirator.

302.8 DOCUMENTATION

Respirator fit-test records must be maintained. Form HS-302 should be used to document the results of each fit test. It should be signed by the individual being tested and also the person administering the test.

HS-302
URS CORPORATION
HEALTH AND SAFETY TRAINING
RESPIRATOR FIT TEST RECORD

Name: _____ **Social Security No:** _____
Company/Office: _____ **Last Medical Exam:** _____
Fit Test Date: _____ **Corrective Lenses Needed:** Yes ☐ No ☐

Briefed on fundamental principles of respiratory protection, use, selection, inspection cleaning, maintenance and storage of equipment. Yes ☐ No ☐

Isoamyl acetate odor recognition Yes ☐ No ☐

	RESPIRATOR 1	RESPIRATOR 2	RESPIRATOR 3
Equipment Type			
Manufacturer's Name			
Model			
Size			
Facepiece Composition (Rubber Silicone)			

TEST PERFORMED	RESPIRATOR 1	RESPIRATOR 2	RESPIRATOR 3
Negative Pressure Test:	P ☐ F ☐	P ☐ F ☐	P ☐ F ☐
Positive Pressure Test:	P ☐ F ☐	P ☐ F ☐	P ☐ F ☐
Isoamyl Acetate Vapor Test:	P ☐ F ☐	P ☐ F ☐	P ☐ F ☐
Irritant Smoke Test:	P ☐ F ☐	P ☐ F ☐	P ☐ F ☐

The individual named above has been fit-tested according to procedures specified in URS's Operating Procedure HS-302. This qualitative fit test protocol has been adapted from OSHA 29 CFR 1910 and 29 CFR 1926.

Examiner's Name (Please Print)	Examiner's Signature	Date

Employee's Signature	Date

303.1 PURPOSE

The purpose of this Operating Procedure (OP) is to provide guidance on the proper care and use of respiratory protective devices, and to assist in adequately protecting personnel as well as complying with Occupational Safety and Health Administration (OSHA) respiratory protection standard Title 29 Code of Federal Regulations (CFR) 1910.134. Guidance in the selection of respiratory devices is provided in OP HS-301.

303.2 APPLICABILITY

This procedure is applicable for use in caring for half-face and full-face respirators of either air-purifying or air-supplying type. Proper care of respirators is essential for their satisfactory performance. Of importance is respirator inspection, care, maintenance, and storage.

303.3 REQUIREMENTS

OSHA requires, as part of an inspection program, that all respirators be leak checked, a determination that the complete assembly is gas tight. Follow field inspection procedures to examine the freshly cleaned, reassembled respirator.

"Cleaning and Disinfecting" - OSHA 1910.134 states "routinely used respirators shall be collected, cleaned and disinfected as frequently as necessary to ensure that proper protection is provided..." and that emergency use respirators "shall be cleaned and disinfected after each use."

The OSHA standard states that "replacement or repair shall be done by experienced persons with parts designed for the respirators." Besides being contrary to OSHA requirements, **substitution of parts from a different brand or type of respirator invalidates approval (i.e., National Institute for Occupational Safety and Health (NIOSH), Mine Safety and Health Administration (MSHA)) of the device.**

OSHA requires that respirators be stored to protect against:

- Dust
- Sunlight
- Heat
- Extreme cold
- Excessive moisture
- Damaging chemicals
- Mechanical damage

The OSHA standard suggests that respirators be in their original cartons, however, this may provide only minimal protection from mechanical damage.

303.4 INSPECTION

303.4.1 Air-Purifying Respirators

Routinely used air-purifying respirators should be checked as follows before and after each use:

1. Examine the facepiece for:
   - Excessive dirt
   - Cracks, tears, holes or physical distortion of shape from improper storage
   - Inflexibility of rubber facepiece (stretch and knead to restore flexibility)
   - Cracked or badly scratched lenses in full facepieces
   - Incorrectly mounted full facepiece lenses, or broken or missing mounting clips
   - Cracked or broken air-purifying element holder(s), badly worn threads or missing gasket(s), if required
2. Examine the head straps or head harness for:
   - Breaks
   - Loss of elasticity
   - Broken or malfunctioning buckles and attachments
   - Excessively worn serrations on head harness, that might permit slippage (full facepieces only)
3. Examine the exhalation valve for the following after removing its cover:
   - Foreign material, such as detergent residue, dust particles or human hair under the valve seat
   - Cracks, tears or distortion in the valve material
   - Improper insertion of the valve body in the facepiece
   - Cracks, breaks, or chips in the valve body, particularly in the sealing surface
   - Missing or defective valve cover
   - Improper installation of the valve in the valve body
4. Examine the air-purifying element for:
   - Incorrect cartridge, canister or filter for the hazard
   - Incorrect installation, loose connections, missing or worn gasket or cross threading in the holder
   - Expired shelf-life date on the cartridge or canister
   - Cracks or dents in the outside case of the filter, cartridge or canister, indicated by the absence of sealing material, tape, foil, etc., over the inlet

5. If the device has a corrugated breathing tube, examine it for:
   - Broken or missing end connectors
   - Missing or loose hose clamps
   - Deterioration, determined by stretching the tube and looking for cracks
6. Examine the harness of a front-or back-mounted gas mask for:
   - Damage or wear to the canister holder, that may prevent its being held in place
   - Broken harness straps for fastening

303.4.2 Atmosphere-Supplying Respirators

For a routinely used atmosphere-supplying device, use the following procedures:

1. If the device is a tight-fitting facepiece, use the procedures outlined under air-purifying respirators, except those pertaining to the air-purifying elements.
2. If the device is a hood, helmet, blouse or full suit, use the following procedures:
   - Examine the hood, blouse or full suit for rips and tears, seam integrity, etc.
   - Examine the protective headgear, if required, for general condition with emphasis on the suspension inside the headgear
   - Examine the protective face shield, if any, for cracks or breaks or impaired vision
   - Make sure the protective screen is intact and secured correctly over the face shield
3. Examine the air-supply systems for:
   - Integrity and good condition of air-supply lines and hoses, including attachment and end fittings
   - Correct operation and condition of all regulators, or other air flow regulators

In addition to the above, for self-contained breathing apparatus (SCBA) units also determine that:

1. The high pressure cylinder of compressed air is sufficiently charged for the intended use, preferably fully charged.
2. On closed-circuit SCBA, a fresh canister of CO_2 (carbon dioxide) sorbent is installed.
3. On open-circuit SCBA, the cylinder has been recharged if less than 25 percent of the useful service time remains.

All SCBAs are required to have a warning device that indicates when the 25 percent level is reached. However, it is recommended that an open-circuit SCBA be fully charged before use.

The specific inspecting procedures for the brand of air-line or SCBA equipment should be followed.

303.4.3 Respirator Disassembly

The used respirators should be collected and deposited in a central location. They are taken to an area where the filters, cartridges or canisters are removed and discarded. Canisters should be damaged or marked to prevent accidental reuse. If facepieces are equipped with reusable dust filters, they may be cleaned with compressed air in a hood. This prevents dust from getting into the room and affecting the respirator personnel. If SCBA are used, tanks are removed and connected to an area where the SCBA regulators and low-air warning devices are tested. SCBA facepieces are cleaned like air-purifying respirator facepieces.

303.4.4 Defects Found in Field Inspection

If defects are found during any field inspection, two remedies are possible. If the defect is minor, repair and/or adjustment may be made on the spot. If it is major, the device should be removed from service until it can be repaired. A spare unit should replace the unit removed from service. **Under no circumstances should a device that is known to be defective remain in the field.**

303.4.5 Inspection During Cleaning

Because respirator cleaning usually involves some disassembly, it presents a good opportunity to examine each respirator thoroughly. The procedures outlined above for a field inspection should be used. Respirators should be inspected after cleaning operations and reassembly have been accomplished.

303.5 RESPIRATOR CARE

When used routinely, respirators should be exchanged daily for cleaning and inspection. Where respirators are used only occasionally, the exchange period could be weekly or monthly. Workers maintaining their own respirators should be thoroughly briefed on cleaning and disinfecting them. Although workers may not be required to maintain their own respirators, briefing on the cleaning procedure will encourage their acceptance of a respirator by providing knowledge of a clean, disinfected, properly maintained device. This is particularly important where respirators are not individually assigned.

Where respirators are individually assigned (a practice to be encouraged), they should be identified to ensure that the worker always receives the same device. Identification markers must not penetrate the facepiece, block the filter, cartridge parts or exhaust valves.

When a relatively small number of respirators are used, or where workers clean their own respirators, the generally accepted procedure is washing with detergent and warm water using a brush, thoroughly rinsing in clean water, and drying in a clean place. Precautions should be taken to prevent damage from rough handling during this procedure.

When large numbers of respirators are used, it is recommended that centralized cleaning and maintenance be performed and that specialized equipment and personnel trained in respirator maintenance be utilized.

303.5.1 Cleaning and Sanitizing

The actual cleaning may be done in a variety of ways. A commercial dishwasher can be used. A standard domestic clothes washer may also be used if a rack is installed around the agitator to hold the facepieces in fixed positions. If the facepieces are placed loosely in the washer, the agitator may damage them. A standard domestic dishwasher may be used, but it is not preferred because it does not immerse the facepieces. Any good detergent may be used followed by a disinfecting rinse or a combination disinfectant-detergent for a one step operation. Disinfection is not absolutely necessary if the respirator is reused by the same person. However, where individual issue is not practical, disinfection is strongly recommended. Reliable, effective disinfectants may be made from readily available household solutions, including:

1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately two milliliters of bleach (such as Chlorox) to one liter of water, or two tablespoons of bleach per gallon of water. A two-minute immersion disinfects the respirators.
2. Aqueous solution of iodine (50 ppm of iodine) made by adding approximately 0.8 milliliters of tincture of iodine per liter of water, or one teaspoon of tincture of iodine per gallon of water. Again, a two-minute immersion is sufficient.

If the respirators are washed by hand, a separate disinfecting rinse may be provided. If a washing machine or dishwasher is used, the disinfectant must be added to the rinse cycle; the amount of water in the machine at that time will have to be measured to determine the correct amount of disinfectant.

To prevent damaging the rubber and plastic in the respirator facepieces, the cleaning water should not exceed 140°F, but it should not be less than 120°F to ensure adequate cleaning. In addition, if commercial or domestic dishwashers are used, the drying cycle should be eliminated, since the temperatures reached in these cycles may damage the respirators.

303.5.2 Rinsing

The cleaned and disinfected respirators should be rinsed thoroughly in water (140°F maximum) to remove all traces of detergent and disinfectants. This is very important for preventing dermatitis.

303.5.3 Drying

The respirators may be allowed to dry in room air on a clean surface. They may also be hung from a horizontal wire, like drying clothes, but care must be taken not to damage or distort the facepieces. Another method is to equip a standard steel storage cabinet with an electric heater that has a built-in circulating fan, and to replace the solid steel shelves with steel mesh.

303.5.4 Reassembly and Inspection

The clean, dry respirator facepieces should be reassembled and inspected in an area separate from the disassembly area to avoid contamination. The inspection procedures have been discussed; special emphasis should be given to inspecting the respirators for detergent or soap residue left

by inadequate rinsing. This appears most often under the seat of the exhalation valve, and can cause valve leakage or sticking.

The respirator should be thoroughly inspected and all defects corrected. New or retested cartridges and canisters should be installed, and the completely reassembled respirator should be tested for leaks.

303.6 MAINTENANCE AND REPAIR

Maintenance personnel must be thoroughly trained. They must be aware of the limitations and never try to replace components or make repairs and adjustments beyond the manufacturer's recommendations, unless they have been specially trained by the manufacturer.

These restrictions apply primarily to maintenance of the more complicated devices, especially closed- and open-circuit SCBAs, and more specifically, regulator valves and low pressures warning devices. These devices should be returned to the manufacturer or to a trained technician for adjustment or repair. There should be no major problems in repairing and maintaining most respirators, particularly the commonly used air-purifying type.

An important aspect of any maintenance program is having enough spare parts on hand. Only continual surveillance of replacement rates will determine what parts and quantities should be kept in stock. It is desirable to have a recording system to indicate spare parts usage and the inventory on hand.

For SCBA devices, the facepiece should be combined with the tested regulator and the fully charged cylinder, and an operational check performed.

303.7 RESPIRATOR STORAGE

Damage and contamination of respirators may take place if they are stored on a workbench, or in a tool cabinet or toolbox, among heavy tools, greases and dirt. Freshly cleaned respirators should be placed in heat-sealed, ziplock, or other reusable plastic bags until reissue. They should be stored in a clean, dry location away from direct sunlight. They should be placed in a single layer with the facepiece and exhalation valve in an undistorted position to prevent rubber or plastic from taking a permanent distorted "set."

Air-purifying respirators kept ready for non-routine or emergency used should be stored in a cabinet with individual compartments. The storage cabinet should be readily accessible, and all workers should be made aware of its location, as is done for fire extinguishers. Preventing serious injury from the inhalation of a toxic substance depends entirely on how quickly workers can get to the emergency respirators.

A chest or wall-mounted case may be used for storing SCBAs for use in emergencies. Again, the location of SCBAs should be well-known and clearly marked. Unlike fire extinguishers, however, they should be located in an area that will predictably remain uncontaminated. Putting on a SCBA in a highly contaminated atmosphere, as might be created by massive release of a toxic material, may take too long a time to perform safely in that area. Therefore, the first reaction should be to escape to an uncontaminated area, then put on the SCBA, that should be located there, and re-enter the hazardous area for whatever task must be done. Exceptions to this

rule may be encountered, and only a thorough evaluation of the process and escape routes will permit a final decision about the correct storage location for SCBAs. Respirators should be stored in a plastic bag inside a rigid container.

Workers who are adequately trained should develop a respect for respirators that will be an automatic incentive to protect respirators from damage. Besides providing better assurance of adequate protection, this training will lower maintenance costs by decreasing damage.

303.8 RECORDKEEPING

Records should be maintained to document that proper care and maintenance has been performed on respiratory protection devices. Records should indicate when and what was done to each respirator, and also by whom.

303.9 REFERENCES

U.S. Department of Labor, OSHA, Safety and Health for General Industry (Title 29 CFR Part 1910), Respiratory Protection 1910.134, U.S. Department of Labor Occupational Safety and Health Administration.

American National Standard, Practices for Respiratory Protection, ANSI Z88.2-1980, American National Standards Institute.

Birkner, L.R., Respiratory Protection A Manual and Guideline, American Industrial Hygiene Association, 1991.

304.1 PURPOSE

The purpose of this Operating Procedure (OP) is to set forth the criteria and methodology to be used in selecting personal protective equipment (PPE). This OP has been developed to help URS Corporation (URS) employees select the appropriate PPE and reduce the risk of occupational injury or illness.

304.2 GENERAL

Personal protective equipment is a means of isolating a worker from a hazard. Use of personal protective equipment places a high degree of responsibility for safety on the field worker. Exposure can occur during lapses in standard operating procedures, failure of protective equipment, removal of protective equipment at the end of work periods, or use of improper or damaged equipment. However, a properly administered personal protective equipment program can offer an effective means of control or as a supplement or backup to controls at the source of hazards.

Personal protective equipment can be divided into three categories:

- Safety equipment (e.g., hard hats, shoes, safety glasses, face shields)
- Protective clothing (e.g., gloves, aprons, coveralls)
- Respiratory devices (e.g., half and full-face air-purifying respirators, supplied air respirators, and self-contained breathing apparatus (SCBAs))

The proper selection of personal protective equipment is an extremely important task. The use of improper equipment can result in the lack of protection from a specific hazard causing potential injury or adverse health effects to personnel. Personal protective equipment should be appropriately selected for a given hazard (existing or expected) with a factor of safety. Over protection is not necessarily appropriate and can result in other potential problems (i.e., heat stress, fatigue, physical hazards).

304.3 IDENTIFICATION OF POTENTIAL HAZARDS

An evaluation of the potential hazards associated with a given task (job safety analysis) and planned work activities should be performed. The evaluation will identify the hazards and types of hazard control, including PPE, that may be utilized..

304.4 PHYSICAL SAFETY HAZARDS

Almost all work sites include various types of physical hazards. These include slipping, tripping, falling objects, electrical shock, puncture, scraping, and catching hazards. The effects of many of these types of hazards can be mitigated with the use of some basic safety equipment.

URS employees will follow all client, URS health and safety plans, and regulatory requirements for hard hats, safety glasses, steel toe shoes, and related protective equipment.

304.4.1 Head Protection

URS employees working in areas with overhead hazards shall use protective helmets (hard hats) that meet the requirements of American National Standards Institute (ANSI) Z 89.1. For proper protection, the hat and harness must be in good condition and worn frontwards.

304.4.2 Eye Protection

Safety glasses shall be used by URS employees when machines or operations present potential eye injury from physical or chemical agents. All eye and face protection shall meet the requirements of ANSI Z 87.1. Employees whose vision requires corrective lenses shall use safety glasses with optical correction or safety glasses or goggles that are designed to fit over the regular glasses.

304.4.3 Foot Protection

URS employees working at field sites shall wear sturdy, closed toe shoes or boots. Specific footwear such as rubber boots, steel toe shoes, or overboots will be used as appropriate to the type of hazards and according to the safety plan or client requirements. If safety shoes or boots are worn, they shall meet the requirements of ANSI Z 41.

304.4.4 Hearing Protection

URS employees working on tasks where the noise level is above 85 dBA (a level difficult to hear normal conversation) shall use hearing protection such as plugs or muffs to reduce the noise level. Detailed information may be seen in the URS Hearing Conservation Program, Operating Procedure HS-212.

304.5 LEVELS OF PROTECTION FOR HAZARDOUS WASTE SITES

Potential hazards associated with contaminants may be minimized by utilizing appropriate personal protective equipment. Personal protective equipment to protect the body against contact with known or anticipated chemical hazards has been divided into four categories (i.e., Levels A, B, C, or D) according to the degree of protection afforded. Level A provides the greatest degree of personal protection while Level D provides the least. A summary of the four levels of protection is presented in Table 304-1. The protection to be used will be specified in the site Health and Safety Plan.

304.6 PROTECTIVE CLOTHING

The category of protective clothing includes: clothing, gloves, and aprons. The choice of clothing to be used should be based on the potential exposure hazards anticipated, the amount of body coverage required, and the material used in clothing construction. To protect the wearer from exposure, the clothing material should be impermeable or at least resistant to the particular hazardous agents expected to be encountered.

Data on the suitability of various types of protective clothing for particular hazards are often limited to manufacturers' bulletins, brochures, or information services. Literature on permeability of various materials includes the manual Guidelines for the Selection of Chemical Protective Clothing, published by the American Conference of Governmental Industrial Hygienists (ACGIH).

With certain compounds, where even minor skin contact may present potential problems, taping of the joints between sleeve and glove, leg and boot and entry seam on the protective clothing is a recommended practice. Removal of exterior pockets on coats and coveralls reduces accumulation of contaminants. Hair coverings may be needed to prevent scalp exposure. Disposable clothing that offers adequate protection (i.e., Tyvek, Polycoated Tyvek (Tyvek QC) or Saranex) is an excellent alternative, especially where there are problems with decontamination and cleaning of regular work clothing, and may be less costly than controlled laundering of clothing contaminated with toxic materials. Care must be exercised when removing contaminated clothing, to prevent exposure to any contaminant compounds present on the outer surface of the protective clothing.

304.7 RESPIRATORY PROTECTION

Respiratory protection is used to reduce exposures involving potential inhalation hazards. Cost effectiveness, acceptability, ease of use, and ability of the worker to wear devices are considerations in determining the proper use of respiratory protective devices. URS Operating Procedures HS-301, HS-302 and HS-303 provide guidance on the selection, use, fit testing, and maintenance of respiratory protection equipment.

Respiratory protection is generally used during the time period necessary to install or implement engineering or work practice controls, during plant maintenance, during emergencies or non-routine operation, or in situations where complete control is not achievable through feasible engineering measures such as with hazardous waste management sites. Also, if engineering controls are not sufficient to reduce exposure to within permissible limits with the necessary degree of confidence, then respiratory protection can be implemented, in addition to engineering controls, to further reduce the level of exposure.

TABLE 304-1

Sample Protective Ensembles

LEVEL OF PROTECTION A			
Equipment	**Protection Provided**	**Should be Used When:**	**Limiting Criteria**
RECOMMENDED: □ Pressure-demand, full-facepiece SCBA or pressure-demand supplied-air respirator with escape SCBA. □ Fully-encapsulating, chemical-resistant suit □ Inner chemical-resistant gloves. □ Chemical-resistant safety boots/shoes. □ Two-way radio communications. **OPTIONAL:** Hard hat. Coveralls. Cooling unit. Long cotton underwear. Disposable gloves and boot covers.	The highest available level of respiratory, skin, and eye protection.	1. The chemical substance had been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on either: - measured (or potential for) high concentration of atmospheric vapors, gases, or particulates; or - site operations and work functions involving a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the intact skin. 2. Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible. 3. Operations must be conducted in confined, poorly ventilated areas until the absence of conditions requiring Level A protection is determined.	Fully encapsulating suit material must be compatible with the substances involved.

LEVEL OF PROTECTION B			
Equipment	**Protection Provided**	**Should be Used When:**	**Limiting Criteria**
RECOMMENDED: □ Pressure-demand, full-facepiece SCBA or pressure-demand supplied-air respirator with escape SCBA. □ Chemical-resistant clothing (overalls and long-sleeved jacket; hooded, one- or two-piece chemical splash suit; disposable chemical-resistant one-piece suit). □ Inner and outer chemical-resistant gloves. □ Chemical-resistant safety boots/shoes. □ Hard hat. □ Two-way radio communications. **OPTIONAL:** Coveralls. Face shield. Disposable boot covers. Long cotton underwear.	The same level of respiratory protection but less skin protection than Level A. It is the minimum level recommended for initial site entries until the hazards have been further identified.	1. The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection. This involves atmospheres: - with IDLH concentrations of specific substances that do not represent a skin hazard; or - that do not meet the criteria for use of air-purifying respirators. 2. Atmosphere contains less than 19.5 percent oxygen. 3. Presence of incompletely identified vapors or gases is indicated by direct-reading organic vapor detection instrument, but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the intact skin.	Use only when the vapor or gases present are not suspected of containing high concentrations of chemicals that are harmful to skin or capable of being absorbed through the intact skin.

TABLE 304-1

Sample Protective Ensembles
page 2 of 2

LEVEL OF PROTECTION C			
Equipment	**Protection Provided**	**Should be Used When:**	**Limiting Criteria**
RECOMMENDED: □ Full-facepiece, air-purifying, canister -equipped respirator. □ Chemical-resistant clothing (overalls and long-sleeved jacket; hooded, one- or two-piece chemical splash suit; disposable chemical-resistant one -piece suit). □ Inner and outer chemical-resistant gloves. □ Chemical-resistant safety boots/shoes. □ Hard hat. □ Two-way radio communications. **OPTIONAL:** Coveralls. Disposable boot covers. Face shield. Long cotton underwear. Use of escape mask during initial entry is optional only after characterization [29 CFR 1910, 120(c)(5)(ii)]	The same level of skin, protection as Level B, but a lower level of respiratory protection.	1. The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any exposed skin. 2. The types of contaminants have been identified, concentrations measured, and a canister is available that can remove the contaminant. 3. All criteria for the use of air-purifying respirators are met.	Atmospheric concentration of chemicals must not exceed IDLH levels. The atmosphere must contain at least 19.5 percent oxygen.

LEVEL OF PROTECTION D			
Equipment	**Protection Provided**	**Should be Used When:**	**Limiting Criteria**
RECOMMENDED: □ Coveralls □ Safety boots/shoes □ Safety glasses or chemical splash goggles. □ Hard hat. **OPTIONAL:** Coveralls. Escape mask. Face shield.	No respiratory protection. Minimal skin protection.	1. The atmosphere contains no known hazard. 2. Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.	This level should not be worn in the Exclusion Zone. The atmosphere must contain at least 19.5 percent oxygen.

1. Source: EPA Standard Operating Safety Guides, 1992.

DRAFT

CMI DATA COLLECTION QUALITY ASSURANCE PLAN OPERABLE UNIT NO. 1 (OU1)

Omaha Shops

Prepared for
Union Pacific Railroad Company
Omaha, Nebraska

UNION PACIFIC

ENVIRONMENTAL MANAGEMENT

July 2000

URS
101 South 108th Avenue
Omaha, Nebraska 68154

RCRA Facility Investigation
Union Pacific Railroad
Omaha, Nebraska
RCRA ID # NED000829754

Kenneth V. Herstowski
EPA Project Manager

_____ _____
Signature Date

(To be determined)
EPA Regional Quality Assurance Manager

_____ _____
Signature Date

Jeff McDermott
UPRR Project Coordinator

_____ _____
Signature Date

Jeff Smith
URS Project Manager

_____ _____
Signature Date

Craig Johnson
URS Quality Assurance Officer

_____ _____
Signature Date

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%R	Percent Recovery
AA	Atomic Absorption Spectroscopy
AOC	Area of Concern
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CMI	Corrective Measure Implementation
CMS	Corrective Measures Study
COPC	Chemical of Potential Concern
CPR	Cardio Pulmonary Resuscitation
CVAA	Cold Vapor Atomic Absorption
DCQAP	Data Collection Quality Assurance Plan
DMP	Data Management Plan
DQOs	Data Quality Objectives
GFAA	Graphite Furnace Atomic Absorption
HSM	Health and Safety Manager
HSP	Health and Safety Plan
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma Emission Spectroscopy
ICV	Initial Calibration Verification
LCS	Laboratory Control Samples
LQMP	Laboratory Quality Management Plan
MSDS	Material Safety Data Sheet
NVLAP	National Voluntary Laboratory Accreditation Program
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PEL	Permissible Exposure Limit
PM	Project Manager
PMP	Project Management Plan
PPE	Personal Protective Equipment
QA/QC	Quality Assurance/Quality Control
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan

RCRA	Resource Conservation and Recovery Act
RHSM	Regional Health and Safety Manager
SCFS	Sample Collection Field Sheets
SDG	Sample Delivery Group
SHSO	Site Health and Safety Officer
SM	Site Manager
SOP	Standard Operation Procedure
SWMU	Solid Waste Management Unit
SWMUs	Solid Waste Management Units
TICs	Tentatively Identified Compounds
TWA	Time-Weighted Average
UPPC	Union Pacific Project Coordinator
UPRR	Union Pacific Railroad
URS	URS Corporation
URSGWC	URS Greiner Woodward Clyde
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
WP	Work Plan

1.1 PURPOSE AND SCOPE

This Data Collection Quality Assurance Plan (DCQAP) for the UPRR Omaha Shops in Omaha, Nebraska, has been prepared in accordance with United States Environmental Protection Agency (USEPA) Requirements for Quality Assurance Project Plans (QAPP), QA/R-5 (USEPA April 1998).

The Omaha Shops are the subject of a USEPA Administrative Order on Consent (Order) under Section 3008(h) of the Resource Conservation and Recovery Act (RCRA). The Order requires UPRR to complete a CMI Work Plan for Operable Unit 1 (OU1) within the Omaha Shops.

1.2 PLAN INTEGRATION

This DCQAP is an integral part of the Omaha Shops CMI planning documents which include the following:

- Project Management Plan (PMP)
- Data Management Plan (DMP)
- Health and Safety Plan (HSP)
- Construction Quality Assurance/Quality Control Plan (CQA/QCP)

The purpose of this DCQAP is to provide specific guidance and quality assurance/quality control (QA/QC) requirements and evaluation criteria for the generation of environmental data of known quality for use in making site-specific decisions.

1.3 DCQAP DISTRIBUTION LIST

The DCQAP has been distributed to the following individuals:

- USEPA Region VII Project Manager (Kenneth V. Herstowski) (3 copies)
- USEPA Region VII Quality Assurance Manager (to be named)
- UPRR Project Coordinator (Jeff McDermott)
- URS Program Manager (Jeff Williamson),
  URS Project Manager (Jeff Smith),
  URS Project Chemist (John Keith),
  URS Site Manager (Chris Poulsen), and
  URS QA Officer (Craig Johnson)

2.1 UPRR OMAHA SHOPS LOCATION AND BACKGROUND INFORMATION

The UPRR Omaha Shops are located at 9th and Webster Streets in Omaha, Nebraska (North 41°15'58" latitude, West 95°55'40" longitude). The legal description of the facility is Township 15 North, Range 13 East, Section 22. The Omaha Shops encompass approximately 184 acres located, just west of the Missouri River in an industrialized area of downtown Omaha (Figure 2-1).

The Omaha Shops included various buildings and production support areas, each having a function in past operations of the facility. The Omaha Shops were in operation for approximately 100 years, with principal functions as a railroad fueling facility, repair shop, paint shop, and car body repair shop for UPRR's locomotive and car fleet.

UPRR used steam engines from the 1860s until the mid-1950s. The original steam engines were fueled by burning wood, coal, fuel oil, and petroleum-based fuel. In the mid-1950s, diesel power became the predominant source of power for train locomotives. During that time, the entire facility was converted from handling steam engines to diesel engines.

From the 1950s to 1988, the site was a major overhaul and maintenance facility for UPRR. In 1988, most of the operations, except the print shop and the car shop, moved to Little Rock, Arkansas. After the operations were moved in 1988, facility demolition began.

The OU1 site includes the surface soils above the normal high water table within the portion of the Omaha Shops that is proposed to be acquired by the City of Omaha for the development of a public-use building project (Figure 2-2).

2.2 DATA QUALITY OBJECTIVES

The purpose of the CMI is to operate, maintain, and monitor the performance of the corrective measure approved by the USEPA for lead-contaminated soils at OU1.

2.2.1 Data Use Categories

Data use categories identified for the UPRR Omaha Shops CMI include:

- Completion of removal of all surface soils with lead concentrations above 1,218 mg/kg.
- Confirm that airborne lead generated during the CMI does not leave the OU1 site.

2.2.2 Data Need Categories

The definition of data use consequently identifies the data needs. The data need categories include:

- Confirmation soil samples: Determines that all surface soils with a lead concentration greater than 1,218 mg/kg are removed.

- Air monitoring: Air monitoring will be completed to confirm airborne lead generated during CMI activities does not leave the OU1 site and onto adjacent properties.

2.2.3 Contaminants and Concentrations of Concern

Based on previous investigations, the contaminant of concern at the OU1 site is lead in the surface soils.

2.2.4 Detection Limit Requirements

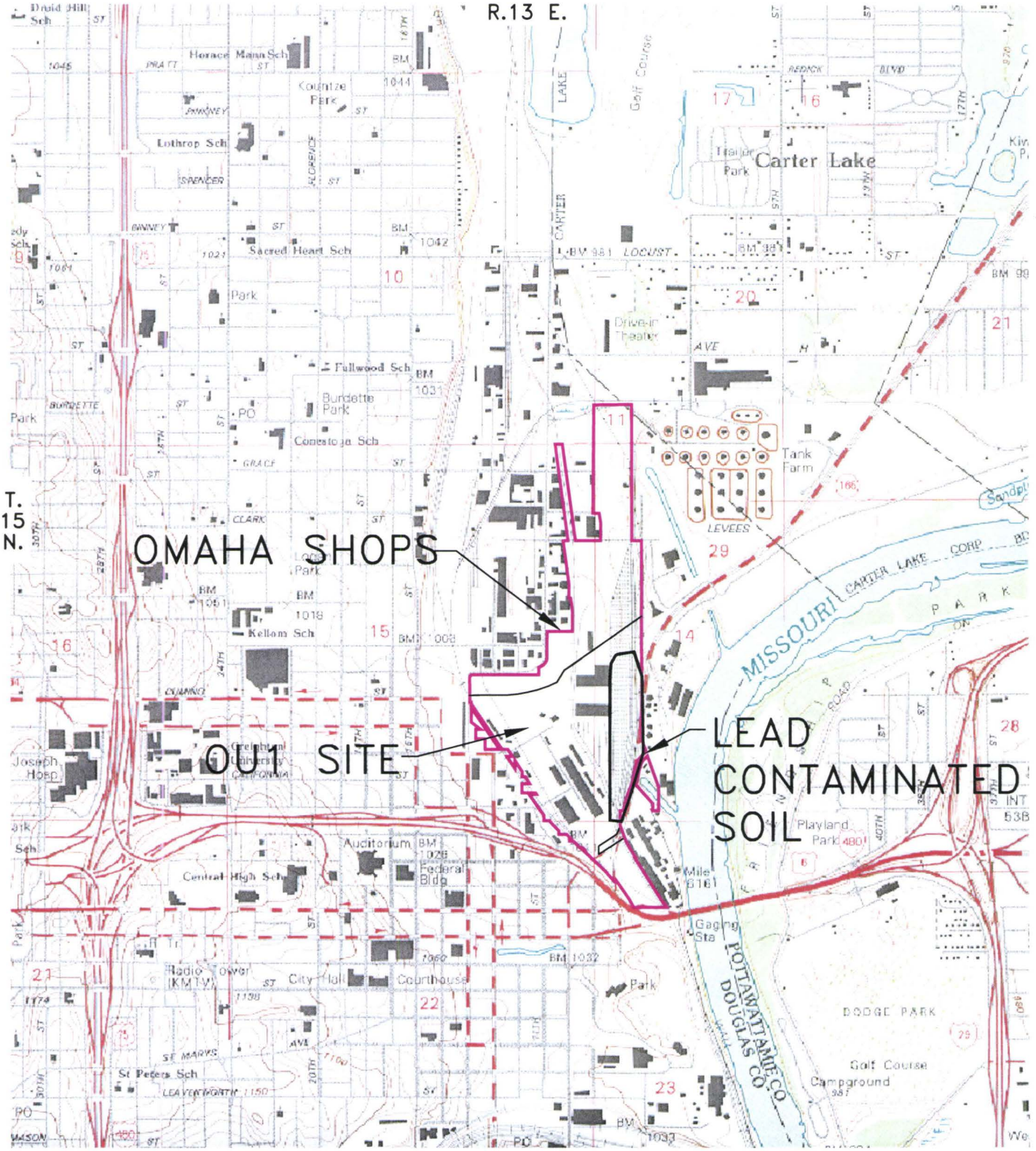
The detection limits required for analyses at the UPRR Omaha Shops are dependent on the levels or concentrations of chemicals of concern and individual study area data. The detection limits for each target compound in the different sample media are discussed further in Section 8 of this DCQAP.

2.2.5 Field Activities

In support of the DQOs for the UPRR Omaha Shops CMI, soil and air samples will be collected and submitted to an off-site laboratory for chemical analysis. All field sampling procedures and proposed initial sampling locations are described in the WP. The analytical methods and QA/QC processes are described in this DCQAP.

The specific field activities that will be completed as part of the CMI include:

- Removal of subsurface soil where contaminant concentrations exceed corrective measure objectives where excavation will occur.
- Removal of surface soil where contaminant concentrations exceed corrective measure objectives.
- Collection of confirmation soil samples.
- Air monitoring for airborne lead.



NEBRASKA

QUADRANGLE LOCATION

BASE MAP SOURCE: USGS 7.5 MINUTE SERIES (TOPOGRAPHIC) QUADRANGLE MAP OF OMAHA NORTH, NE.–IA., 1994.

2000 1000 0 2000

SCALE IN FEET

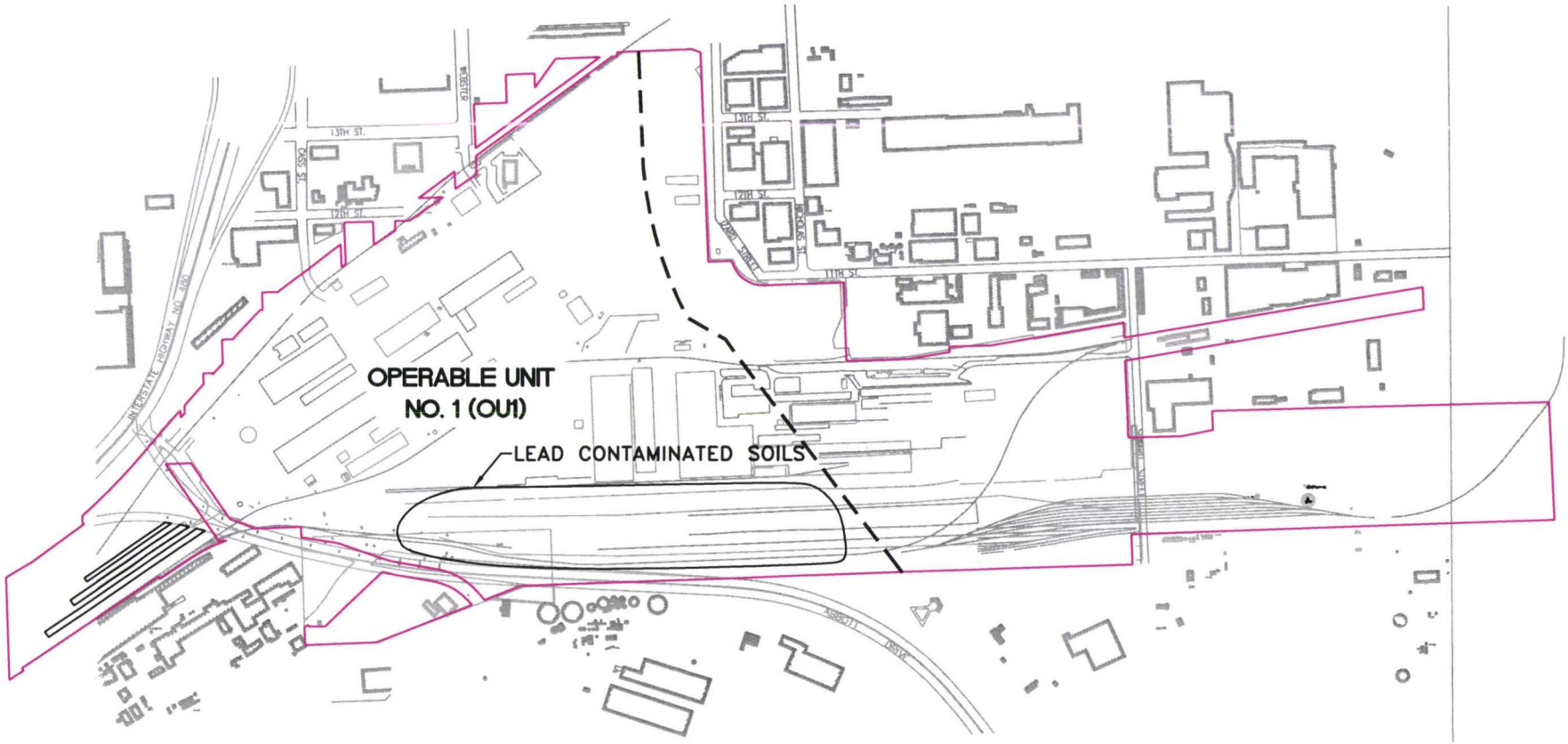
May 09, 2000 6:14:09 a.m.
Drawing: T:\91MC204\FIG-1.DWG (DAP)
Xrefs: uprrpropline2.DWG

OMAHA SHOPS LOCATION

OMAHA SHOPS
UNION PACIFIC RAILROAD COMPANY

URS Greiner Woodward Clyde

DRN BY DAP	DATE 12/15/99	PROJECT NO. 45-091MC204.02	FIG. NO. 2-1
CHK'D BY .	REVISION .		



LEGEND

UPRR OMAHA SHOPS PROPERTY LINE

OU1 SITE AREA BOUNDARY

800 400 0 800

SCALE IN FEET

OPERABLE UNIT 1

OMAHA SHOPS
UNION PACIFIC RAILROAD COMPANY

URS Greiner Woodward Clyde

DRN BY DAP	DATE 11/30/99	PROJECT NO.	FIG. NO.
CHK'D BY .	REVISION 0	45-091MC204.02	2-2

July 26, 2000 4:59:20 p.m.
Drawing: T:\91MC204\SP02\T02200\F1-2.DWG (BAG)
Xrefs: uprrpropline.DWG DRILLHOLES.DWG

3.1 PROJECT ORGANIZATION

A project quality assurance organization chart is shown on Figure 3-1. The organization chart illustrates the preferred lines of communications. The responsibilities of the project team members are described below.

3.2 PROJECT RESPONSIBILITIES

The UPRR Project Coordinator (PC) has overall responsibility for assuring the project meets quality objectives. The UPRR PC has responsibility and authority to accept or reject subcontracted work and to stop work, if needed. All communications between the UPRR Omaha Shops team and USEPA will be undertaken through the UPRR PC.

The URS Project Manager (PM) has primary responsibility for the completion of all activities on the project. The URS PM is responsible to UPRR for the day-to-day control of planning, scheduling, cost control, and implementation of the project, and for the development of the technical reports and project planning documents. The URS PM is responsible for ensuring work is completed in accordance with the planning documents. The URS PM monitors all project personnel in planning, coordinating, and controlling all technical aspects of the tasks.

The URS QA Officer (QAO) reports to the URS PM and works directly with the URS PM and other personnel. The QAO is responsible for auditing the implementation of the QA program, and providing technical assistance to the project staff. The QAO is also responsible for overseeing technical analysis of data and for providing recommendations to the URS PM concerning data quality issues and quality assurance issues identified by the Project Chemist, Field Manager, or project staff. The QAO will remain independent of direct job involvement and day-to-day operations. The QAO has the authority to stop work on the investigation if serious QA/QC issues arise.

The URS Project Health and Safety Officer (PHSO) reports to the URS PM, and works directly with the URS PM and other project personnel. The PHSO has the responsibility to monitor and verify that the work is performed in accordance with the HSP written for the Omaha Shops CMI. The PHSO will advise the URS PM regarding health and safety issues, but will function independently of the URS PM. The PHSO will also designate and oversee the activities of the Site Health and Safety Officer.

The URS Site Health and Safety Officer (SHSO) monitors all site activities and is responsible for the implementation of and compliance with the HSP. The SHSO reports directly to the PHSO. The SHSO has the authority to stop any fieldwork on the Omaha Shops CMI if and health and safety issues arise.

The URS Project Chemist is responsible for communications with the analytical laboratory, evaluating data for quality assurance objectives, implementing appropriate corrective actions for unacceptable data. The Project Chemist reports directly to the URS PM.

The URS Project Site Manager (SM) is responsible for day-to-day coordination and supervision of all field work in accordance with the WP, DCQAP and other planning documents. The SM reports directly to the URS PM. The SM has the authority to stop work on the investigation if serious QA/QC issues arise.

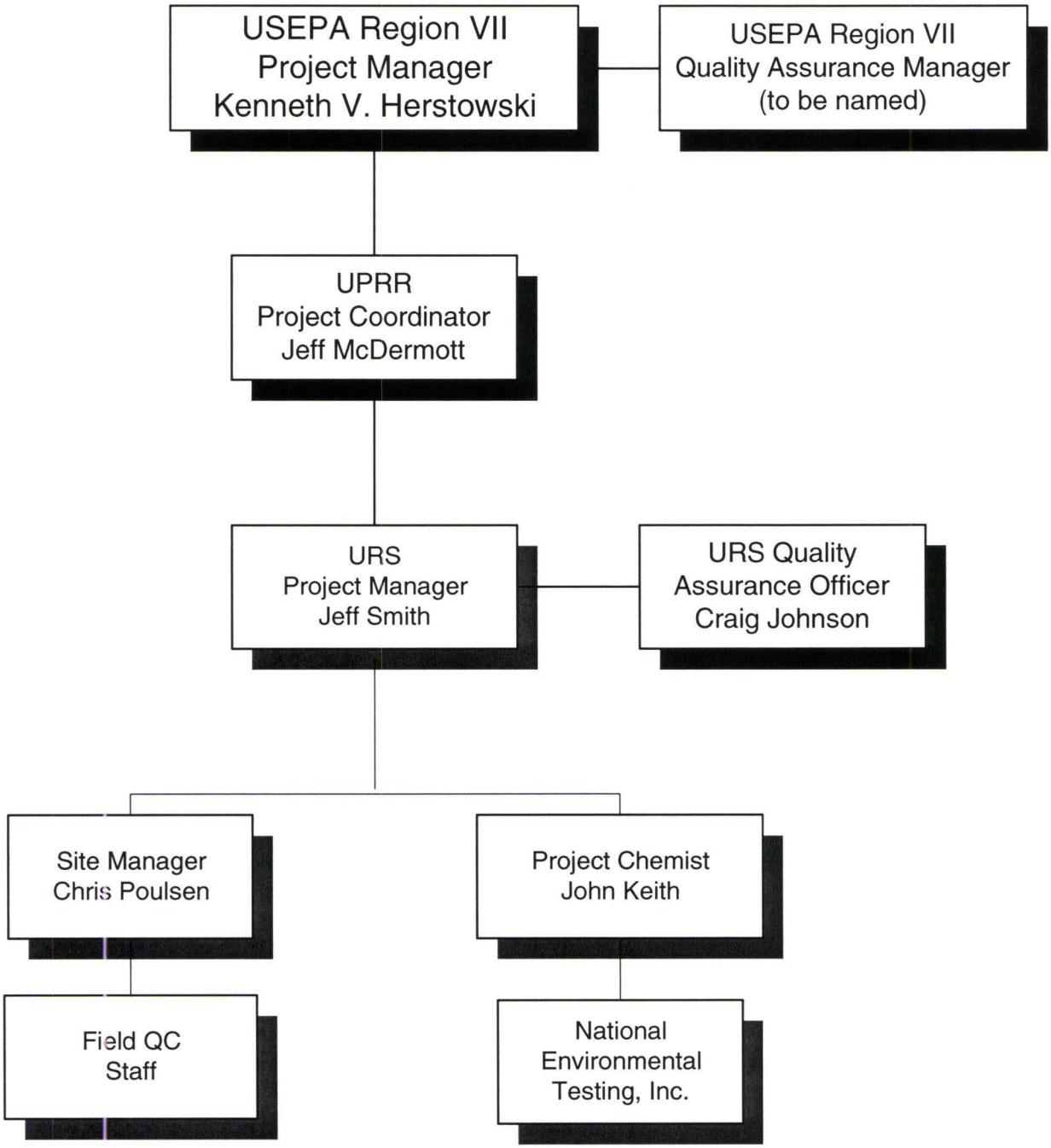
Each member of the Field QC Staff is responsible for understanding and implementing the QA/QC program as it applies to their project activities. The project staff members are responsible to the field manager and/or the URS PM for completion of assigned project activities.

National Environmental Testing, Inc. (NET, Cedar Rapids, Iowa), a division of Test America, has been selected as the off-site analytical laboratory for the OU1 portion of this project. The laboratory organization is described in their Laboratory Quality Assurance Management Plan (LQMP).

The laboratory Quality Assurance Managers (or designee) for NET are responsible for evaluation of the quality of the data based on the established set of laboratory guidelines. The laboratory will review the data package to ensure:

- Sample preparation information is correct and complete
- Analysis information is accurate and complete
- The appropriate SOPs have been followed
- Analytical results are correct and complete
- QC samples are within established control limits
- Analytical requirements have been met
- Documentation is complete

A copy of the laboratory's LQMP (or equivalent) is kept in the project files.



ENVIRONMENTAL MANAGEMENT

URS

QUALITY ASSURANCE ORGANIZATION CHART
UPRR OMAHA SHOPS - OMAHA, NEBRASKA

DRN. BY: jdg	DATE: 07/25/00	PROJECT NO.	FIG. NO.
CHK'D. BY:	DATE:	45-091MC204.02	3-1

q:\91mc20~2\ou1cmi~1\dcqp_f31.vsd 7/25/00 11:55 AM (jdg) (1 of 1)

4.1 GENERAL

The overall QA objective for the UPRR Omaha Shops CMI is to develop and implement procedures for sampling, laboratory analyses, field measurements, and reporting that will provide quality data consistent with its intended use as identified in Section 2. The sample set, chemical analysis results, and interpretations must be based on data that meet or exceed quality assurance objectives established for the project. Quality assurance objectives for field measurement systems are also an important aspect of these investigations. The Project Chemist is responsible for implementing appropriate corrective actions. The following paragraphs discuss field and laboratory analytical measurements. The level of the quality control effort required for analytical testing is summarized in Table 4-1.

Quality assurance objectives are usually expressed in terms of accuracy, precision, completeness, representativeness, sensitivity, and comparability. Target ranges for these objectives are presented for analytical testing and field measurements. Variances from the quality assurance objectives will result in the implementation of appropriate corrective measures and an assessment of the impact of corrective measures on the usability of the data in the decision-making process. The following information is provided for the laboratories to be involved with the UPRR Omaha Shops CMI:

National Environmental Testing, Inc. (A division of Test America, Inc.)
704 Enterprise Drive
Cedar Falls, IA 50613-0625
(800) 750-2401
(319) 277-2401
Fax (319) 277-2425
POC: Rowdy Bindert

4.2 FIELD QA/QC SAMPLES

The following paragraphs describe the QA/QC samples collected in the field to assess the precision and accuracy of the sampling and both the on-site and off-site analysis programs.

4.2.1 Duplicates

Field duplicate samples will be collected and submitted for analysis in conjunction with the field samples. Field duplicates will be sampled such that collocated samples will be obtained from the sampling device in a manner which minimizes loss due to volatilization.

Field duplicate results will provide estimates of overall precision of sample collection, field sample preparation, and laboratory analysis (total within-batch measurement variability). Subdividing one or both of the collocated samples just prior to analysis provides for an estimate of laboratory precision. Soil field duplicates collected will represent a minimum of 10 percent of the total samples collected for the CMI. Field duplicates will have identification numbers that are different than their associated field sample. Additional duplicates may be collected when conditions encountered during field activities have a potential to jeopardize sample integrity.

These conditions may include malfunctioning sampling equipment. The criteria for field duplicate sample precision is 50% RPD for soil samples.

4.2.2 Matrix Spike/Matrix Spike Duplicate Samples

Additional volume will be collected for matrix spike and matrix spike duplicate (MS/MSD) analysis. Results will be used to assess the potential for sample matrix interferences.

The rate of MS/MSD collection will be 5 percent for soils. Samples in excess of the 5-percent minimum may be collected for MS/MSD analysis, depending upon conditions encountered during field activities. Additional MS/MSD analysis would be run whenever such collection and analysis is required for assessing the usability of the data. MS/MSD criteria are presented in Table 4-3.

4.3 LABORATORY QA/QC SAMPLES

The laboratory QC level of effort provided by the laboratory would be equivalent to the level of QC effort specified in EPA SW-846 methodology. The laboratory quality control samples are discussed below.

4.3.1 Method Blank

A method blank for aqueous samples consists of analyte-free deionized water. The blank is carried through each step of the analytical method. The blank data will be used to evaluate contamination attributed to laboratory operations during analysis.

4.3.2 Surrogate Spikes

Surrogate spikes are compounds added to every sample, blank matrix spike, matrix spike duplicate, and standard when specified in the analytical methodology. The results are utilized to evaluate the accuracy of analytical measurement on a sample-specific basis. Surrogates are generally brominated, fluorinated, or isotopically labeled compounds not expected to be detected in environmental media. Results are expressed as percent recovery (%R) of the surrogate spike. Outlying recoveries may indicate matrix interference or sample preparation problems. Surrogate %R criteria are presented in Table 4-4.

4.3.3 Laboratory Control Samples (LCS)

Laboratory control samples (LCS) are well-characterized, laboratory-generated samples consisting of an analyte free sample matrix, spiked with known concentrations of certain target compounds. LCSs will be used to monitor the off-site laboratory's day-to-day performance of analytical methods. LCS will be used to monitor the precision and accuracy of the analytical process independent of matrix effects. LCS %R criteria are presented in Table 4-2.

The results of the LCS will be compared to well-defined evaluation criteria to determine whether the laboratory system was "in control." Controlling lab operations with LCS (rather than

surrogates or MS/MSD) offers the advantage of being able to differentiate low recoveries due to procedural errors from those due to matrix effects.

4.4 QUANTITATIVE QA/QC MEASUREMENTS

4.4.1 Precision

Precision is the measure of variability between individual sample measurements under prescribed conditions. Precision can be assessed by replicate measurements of known laboratory standards and analysis of duplicate environmental samples. Replicate samples can be compared by calculating the sample standard deviation; however, precision will more typically be determined as relative percent difference (RPD) between duplicate sample results (i.e., field duplicate samples).

Replicate measurements of known standards (laboratory control samples) are routinely monitored by the laboratory by comparing the RPD with control limits established at plus three standard deviations from the mean RPD of historical data. Duplicate environmental samples are submitted from the field at a rate of one duplicate for every 10 environmental samples. Precision criteria for MS/MSD are provided in Tables 4-3.

4.4.2 Accuracy

Accuracy is the degree of agreement of a measurement to an accepted reference or true value. An evaluation of the accuracy of a measurement system provides an estimate of bias. The accuracy of an analytical method is evaluated by analyzing known reference standards. The percent recovery achieved by analysis of known reference standards, or spiking compounds, will be used to define the accuracy for the compounds of interest. One known reference standard is also analyzed for every batch of 20 samples or less. The percent recovery of an analyte is calculated by dividing the observed value (X) by the "true" value (T) and multiplying by 100.

The specific criteria ranges of accuracy for each measurement parameter are defined in the analytical test methods. Acceptable accuracy measures are also dependent on the sample matrix. Surrogates, LCS, and MS/MSD samples will be used to measure accuracy for the samples collected for the UPRR Omaha Shops CMI. Criteria for surrogates, LCS, and MS/MSD recoveries are summarized in Tables 4-2, 4-3, and 4-4.

4.4.3 Project-Required Sensitivity

Sensitivity broadly describes the method detection limits/reporting limits established to meet project-specific DQOs. Reporting limits are defined as the lowest level of measurement that can be reported by the laboratory to be present in the sample within specified limits of precision and accuracy under routine laboratory operating conditions.

Method detection limits are determined by the laboratory and defined as the concentration that the laboratory can reliably quantitate on multiple analyses. The reporting limit can be equal to the quantitation limit, but are often higher since quantitation limit studies are performed using

laboratory-prepared samples (spiked deionized water); whereas, environmental samples are naturally variable. The project-specific reporting limit goals for analyses to be conducted are discussed in Section 8. Factors that may result in elevated reporting limits are discussed below:

- High concentrations of target or non-target compounds may require the sample be diluted to allow accurate quantitation of the analyte concentration within the calibration range of the instrument. Consequently, reporting limits are elevated in proportion to the dilution factor.
- Matrix interferences may require that the sample be diluted to reduce or eliminate potential interferences. Consequently, reporting limits are elevated in proportion to the dilution factor.
- Soil analytical results and reporting limits are corrected for the moisture content of the sample. The soil reporting limits listed in Section 8 are based on a wet weight basis. Reporting limits for soil samples corrected for moisture content (reported on a dry weight basis) will be higher. Since moisture content varies from sample to sample, reporting limits will vary accordingly.
- Physical characteristics of the sample matrix may not allow concentration to the required final volume during sample preparation, resulting in a larger sample extract volume. The reporting limits are elevated in proportion to the change in sample extract volume.

The reporting limits required for the analysis of samples collected for the UPRR Omaha Shops CMI are as low as necessary to achieve the data quality objectives. However, when using SW-846 methodologies that cover a broad range of compounds, it is not always possible to achieve reporting limits this low. Reporting limits for the UPRR Omaha Shops CMI are listed in Table 8-2.

4.4.4 Analytical Completeness

Analytical completeness is defined as the percentage of valid analytical results obtained from measurement systems compared with the total number of analytical results requested. Based on an extensive EPA database for the Contract Laboratory Program (CLP), laboratories generally achieve 80 percent completeness (USEPA 1987).

An overall completeness goal for data essential to making decisions is 100 percent. Although this goal may not be achieved, it may still be possible to make site-specific decisions. The impact of rejected or missing data on project decisions will be evaluated by the Project Manager and Project Chemist on a case-by-case basis. Furthermore, the auditing procedures that are in place with URS assist in the selection of subcontract laboratories that demonstrate good quality practices and through good communication with the laboratory, analytical completeness is generally not less than 90 percent. During the assessment of the data, an evaluation of samples needed to make decisions with respect to project objectives will be made.

4.5 QUALITATIVE QA/QC MEASUREMENTS

4.5.1 Representativeness

Representativeness is the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Although representativeness is a qualitative measurement, it is evaluated through a multistep process beginning with a quantitative check of accuracy and precision data as described in Sections 4.4.1 and 4.4.2.

In the case of field duplicate samples, which will be collected and utilized as a means to assess field representativeness, satisfactory representativeness will first be assessed by the agreement between analytical results for collocated field duplicate samples. The data will be evaluated for appropriateness for use in the RPD comparison by the following criteria. For analytes with both sample concentrations greater than 5x the reporting limit, the duplicate sample results should agree within 50% for soil samples. For analytes with either or both sample concentrations less than 5x the reporting limit, duplicate sample results should agree within ± 2x the reporting limit. Results for analytes not meeting these criteria will be evaluated by the Project Chemist in light of project objectives and, if professional judgment warrants, qualified as estimated in all associated samples during the review process.

Whether or not the sampling effort is completed in compliance with the procedures described in Section 5 of this DCQAP, and in respective sections in the WP, is another factor utilized in the evaluation of representativeness. When recommendations are made concerning the representativeness of the data, available information in terms of project objectives will be considered.

4.5.2 Comparability

Comparability expresses the confidence with which one data set can be compared to another. Comparability also involves a multi-step evaluation and can be related to accuracy and precision as these quantities are measures of data reliability. Data are comparable if siting considerations, collection techniques, sample matrix, and measurement procedures, methods, and reporting are equivalent.

Soil samples collected during the OU1 CMI will be used in comparability assessments with other soil data previously collected at the UPRR Omaha Shops site.

TABLE 4-1

QC LEVEL OF EFFORT FOR ANALYTICAL TESTING UPRR OMAHA SHOPS CMI

Parameters	QC Measure	Frequency
Metals	Surrogate Spike	Each sample
	Calibration Blank	Each calibration, beginning and end of each run; 10% frequency
	Initial Calibration Verification	Daily for each instrument setup
	Continuing Calibration Verification	Beginning and end of each run; 10% frequency or every 2 hours
	Preparation Blank	One per analytical batch[1]
	Laboratory Duplicate	One per 10 samples of each matrix
	Matrix Spike Analysis/Matrix Duplicate	One per 10 samples of each matrix
	Laboratory Control Sample Analysis	One per analytical batch [1]1
	Analytical Spike (AA-Furnace)	Each sample (at least a single analytical spike will be performed to determine if the method of standard is required)
	Serial Dilution (ICP)	One per sample delivery group [1]

[1] An analytical sample batch consists of 20 samples or less, prepared or analyzed together with a common QC samples

TABLE 4-2

QC ACCEPTANCE CRITERIA FOR LABORATORY CONTROL SAMPLES UPRR OMAHA SHOPS CMI

Method [1]	Analyte	Accuracy as % Recovery [2]
		Soil/Sediment
Metals	All individual analytes	80-120

[1] Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition, Final Update IIB.

[2] Test America Incorporated, Quality Assurance/Quality Control Manual, October 1999. The QA/QC these limits are based on laboratory historical data and are evaluated and updated periodically. If limits are updated prior to or during analysis of samples, an Addendum will be filed to amend the WP.

TABLE 4-3

QC ACCEPTANCE CRITERIA MATRIX DUPLICATES, MATRIX SPIKE, MATRIX SPIKE DUPLICATES AND FIELD DUPLICATES UPRR OMAHA SHOPS CMI

Method	Analyte	Accuracy as % Recovery	Precision as RPD (%)
		Soil/Sediment	Soil
Metals	All individual analytes	75-125	35
Field Duplicates All Methods	All Analytes	--	50

RPD – Relative Percent Difference

5.1 OVERALL PHILOSOPHY

The attainment of good quality data that is legally defensible and from which sound remedial decisions can be made involves many critical steps, not the least of which is sampling. Sampling and related activities provide the representative media upon which all subsequent steps, analyses, evaluation, and remedial design, will be based. Therefore, the proper performance of sampling procedures, along with good quality control and quality assurance documentation, is critical for the production of representative samples.

The following paragraphs identify the general procedures which will be used during the investigations at UPRR Omaha Shops.

5.2 QUALIFICATIONS OF SAMPLING PERSONNEL

The personnel responsible for sampling and other field activities will have the experience required for sampling the different matrices. The field personnel will have read and become familiar with the WP, appropriate QAPP sections and other project documents, as well as the SOPs to be used at the UPRR Omaha Shops site. They will know the importance and level of quality control that must be maintained in order to produce the most representative samples. Loss of volatiles is always of major concern and particular care shall be used when collecting sample for volatile analyses. The level of completeness is dependent on the proper collection of samples; therefore, sampling activities will be appropriately monitored throughout the investigative activities at the UPRR Omaha Shops by URS QA/QC personnel.

5.3 SAMPLING AND FIELD PROCEDURES

Sampling locations and the minimum number of samples needed to meet data objectives are described in the CMI Work Plan. Sampling and field procedures that will be used for the UPRR Omaha Shops CMI are described below. Any modifications to these sampling methods must be approved by the URS Quality Assurance Officer before implementation. Standard Operating Procedures (SOPs) for the described activities are included in the RFI Work Plan for Operable Units 2 and 3 DCQAP.

5.3.1 Soil Sampling

Soils samples will be collected at the OU1 site as specified in the CMI WP. Soil samples will be collected at specified target depth(s) using a stainless-steel split-spoon sampler or a stainless-steel hand auger as detailed in SOP No. 1.

Unified Soil Classification System (USCS) descriptions of the recovered soil samples will be recorded in the field logbook by a geologist or engineer.

5.3.2 Surveying

Near the completion of the CMI fieldwork, all sampling locations will be surveyed for coordinates and elevations. The elevations will be surveyed to the closest 0.01-foot based on the National Geodetic Vertical Datum from 1927. The coordinates will be surveyed to the closest foot and referenced on the Nebraska State Plane Coordinate System.

5.4 RATIONALE FOR SAMPLE SITE SELECTION

The rationale and numbers for soil sampling are described in the UPRR Omaha Shops CMI WP. The selection of sampling locations are anticipated to fulfill the objectives described in Section 2 of this DCQAP and detailed in the UPRR Omaha Shops CMI WP.

5.5 SAMPLING EQUIPMENT

Sampling equipment used for the investigative activities at the UPRR Omaha Shops are specified in each of the appropriate SOPs. Sampling equipment will be prepared for use and used to collect samples as described in the SOP.

Thorough decontamination of all sampling equipment will be performed to prevent cross-contamination of samples. Decontamination will be performed prior to initial equipment use, between sampling locations, and before equipment is removed from the UPRR Omaha Shops property. All decontaminated equipment will be inspected prior to used by the URS field manager (or designee). Decontamination of sampling equipment will be completed as specified in SOP No. 6. All precautions will be taken to avoid sample contamination.

5.6 SAMPLE CONTAINERS AND PRESERVATION

The type of sample container to be used is dependent on the analyses to be completed. Table 5-1 specifies the proper sample container, volume of sample required, preservative needed, and maximum holding time for each analysis. The laboratory will provide certified pre-cleaned sample containers to the URS field crew. The containers should remain sealed and stored in a clean environment until they are ready for use. SOP No. 12 summarizes the general requirements for sample containers.

TABLE 5-1

SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES UPRR OMAHA SHOPS CMI

Analytical Method	Parameter	Containers per Sample	Minimum Sample Size	Preservation	Holding Time
Soil					
6010B/7000 series	Total Metals[1]	One 16-oz widemouth glass jar with Teflon-lined septa	10 grams	4° C	6 months 28 days Hg

Notes: [1] Total metals include analysis of eight RCRA metals. In addition to Method 6010, includes 7060 (arsenic), 7421 (lead), 7740 (selenium), and 7470 (mercury).

6.1 OVERVIEW

Verifiable sample custody is an integral part of all field and laboratory operations associated with the UPRR Omaha Shops CMI activities. Traceable steps will be taken in the field and in the laboratory to document and ensure that all samples have been properly acquired, preserved, identified, and that sample integrity has not been jeopardized. The following sections provide detail related to completing verifiable field and laboratory documentation. Field documentation procedures are outlined in SOP No 5.

6.2 FIELD LOGBOOK

Bound field logbooks will be used to record pertinent information during the field activities. Documentation in the field logbook will be sufficient to reconstruct the sampling situation without relying on the memories of the field team members. Information recorded at the beginning of each day will include, but is not limited to:

- Project Name and Number
- Date
- Signature of any team member entering information on each respective page
- Current weather conditions and daily forecast
- Names of all personnel on site, including subcontractors and site visitors
- Initial PPE level
- Health and Safety Information
- Field Instrument calibration information.

Information recorded during each sampling point will include, but is not limited to:

- Sampling location (sampling point identification)
- Sample identification
- Sampling depth
- Sample media
- Description of sample
- Chemical analysis requested, sample container, and preservative
- Any modifications to the sampling plan
- Sampling observations (if applicable)
- Field equipment readings
- QC/QA samples collected (if applicable)

In addition, field sketches will be made in the field logbook when appropriate including (but not limited to), sampling location sketches including reference points tied to existing permanent structures in the area (trees, fences, buildings, etc.).

All entries will be made in blue or black indelible ink and no erasures are allowed. If an incorrect entry is made, the information will be crossed out with a single strike mark and the change initialed and dated by the team member making the logbook change. Each page in the field logbook will be signed and dated at the bottom of the page by any team member making entries on the page.

The field logbooks will be identified on the cover by the project name, project number and the logbook number. The logbooks will stored in the field project files when not in use. At completion of the field activities, the original field logbooks will be submitted to the Project Coordinator to be retained in the project file or released to UPRR upon written request.

6.3 ADDITIONAL FIELD DOCUMENTATION

6.3.1 Sample Collection Field Sheets

To supplement the information recorded in the field logbook, sample collection field sheets (SCFSs) will also be completed for each sampling location. The SCFS will be cross-checked for completeness and accuracy at the end of each day. The SCFS will be signed and dated by the sampler making entries on the SCFS. Details of completing the SCFS is included in the appropriate sampling SOPs. An example of an SCFS is shown on Figure 6-1.

6.3.2 Daily Construction Reports

To further supplement the information recorded in the logbook, daily construction reports will be completed for each day's work. The daily construction reports will be completed by each sampling team leader and cross-checked at the end of the day by the SM for accuracy and completeness. The daily construction reports will be signed and dated by each field team member making entries. The daily construction reports will be forwarded to the URS PM weekly for review. An example of a daily construction report is shown in Figure 6-2. Additional field documentation are detailed in SOP No. 5.

6.3.3 Photographic Documentation

Digital photographs may be taken of various field activities as necessary by the field manager. Details of the photograph including date, time, location, field activity, description of landmarks in the photograph and the name of the photographer will be recorded in the field logbook. If a file name is associated with the photograph, the file name will also be recorded. All photographs will be downloaded from the digital camera and placed in the project files.

6.4 SAMPLE LABELING

Samples collected during the UPRR Shops CMI activities will have discrete sample identification numbers. The unique sample identifications are necessary to identify and track each of the many samples collected for analysis during the duration of the project. Whenever possible, sample labeling procedures from previous investigations should be followed. Using previous sample labeling procedures will make use of all available project data in the site evaluation process easier. Samples collected during the field activities for the UPRR Omaha Shops CMI will be labeled with unique sample numbers as indicated in SOP No. 5.

6.5 CHAIN-OF-CUSTODY

The purpose of the chain-of-custody procedure is to prevent misidentification of samples, prevent tampering of the samples during shipment and storage, allow easy identification of tampering, and allow for easy tracking of possession. If the chain-of-custody is broken at any time from sample collection through sample analysis, the URS Quality Assurance Officer will be notified. The URS Quality Assurance Officer is responsible for implementing corrective action and responsible for ensuring that all necessary documentation is completed.

Three-sheet carbon Chain-of-Custody forms will be used. The original (white) sheet and one copy (yellow) sheet will accompany the samples to the laboratory. The original (white) will ultimately be included in the hard copy sample results. The laboratory will keep the copy (yellow) sheet on file for a minimum of one year. The second copy (pink) sheet will be kept by the sampling team and will be included in the field activities documentation file.

The laboratory will compare the samples entered on the Chain-of Custody forms with the sample containers received by the laboratory. If the laboratory finds any discrepancies, the laboratory will contact the URS Project Chemist for resolution. The Chain-of Custody forms will be the primary source of information for the laboratory to enter data into the laboratory's sample tracking system. Additional chain-of-custody procedures are detailed in SOP No. 5.

6.6 SAMPLE CUSTODY SEAL

When samples leave the sampler's immediate control (e.g., shipment to laboratory), custody seals should be placed on both the front and back of the shipping container. The custody seals should bear the collector's name and the date signed. The sample custody seal is used to ensure that the samples in the shipping container have not been tampered with, therefore ensuring sample integrity.

6.7 LABORATORY DOCUMENT CONTROL

The laboratory's document control procedures are specified in their LQMP. A copy of this document is kept in the project files.

FIGURE 6-1
SOIL SAMPLE COLLECTION FIELD SHEET

SITE NAME _____ PROJECT NO. _____

SAMPLE NO. _____ WELL NO. _____

DATE/TIME COLLECTED _____ PERSONNEL _____

SAMPLE METHOD AND DEPTH _____ _____

SAMPLE MEDIA (Circle 1): Soil Sediment Sludge MS/MSD

SAMPLE SPLIT (Circle 1): Yes No SPLIT SAMPLE NUMBER _____

FIELD DUPLICATE (Circle 1): Yes No DUPLICATE SAMPLE NUMBER _____

Sample Container	Preservative	Analysis Requested

DESCRIPTION:

DEPTH: DESCRIPTION:

Comments _____

FIGURE 6-2

URS **DAILY CONSTRUCTION REPORT**

CONTRACTOR _____
PROJECT _____
LOCATION _____
DATE _____
PROJECT NO. _____

DAY	S	M	T	W	T	F	S

WEATHER	CLR	P.LY	CLDY	FOG
TEMP	HIGH	75°F	LOW	89°F
WIND	CALM	MOD	HIGH	
PREC	RAIN	LITE	MOD	HIGH
	SNOW	LITE	MOD	HIGH

EQUIPMENT ON SITE	A/I	EQUIPMENT ON SITE	A/I	EQUIPMENT ON SITE	A/I

SUBCONTRACTORS ON SITE	SUBCONTRACTORS (CONT.)	MATERIAL DELIVERED

SUMMARY OF ACTIVITIES/DISCUSSIONS/DECISIONS

DISTRIBUTION: 1. Project File
2. Project Engineer

OBSERVER _____

All field and laboratory instrumentation will be calibrated prior to and during continued use. The calibration and maintenance history of the project-specific field and laboratory instrumentation is an important aspect of the project's overall QA/QC program. As such, all initial and continuing calibration procedures will be implemented by trained personnel following the manufacturer's instructions and EPA specifications to ensure the equipment is functioning within the tolerances established by the manufacturer and the EPA method-specific analytical requirements.

7.1 FIELD INSTRUMENTS AND EQUIPMENT

The calibration and general maintenance of field instrumentation will be the responsibility of the Field Manager. All documentation pertinent to the calibration and/or maintenance of field equipment will be maintained in a dedicated, active field logbook. Entries made into the logbook regarding the status of any field equipment will contain, but are not necessarily limited to, the following information:

- Date and time of calibration
- Name of person conducting calibration, type of equipment being serviced, and identification number (such as the serial number)
- Reference standard used for calibration (such as isobutylene calibration gas)
- Calibration and/or maintenance procedure used
- Other pertinent information

Equipment that fails calibration and/or becomes otherwise inoperable during the field investigation will be removed from service and segregated to prevent inadvertent use. Such equipment will be properly tagged to indicate that it should not be used until the nature of the problem can be ascertained. Equipment requiring repair or re-calibration must be approved for use by the Field Manager prior to placement back into service. Equipment that cannot be repaired or recalibrated will be replaced.

7.2 LABORATORY INSTRUMENTATION

Calibration of all analytical instrumentation is required to ensure that the analytical system is operating correctly and functioning at the required sensitivity to meet project-specific data quality objectives. The calibration of all laboratory equipment is the responsibility of the operation chemist or technician. Each instrument will be calibrated with standard solutions appropriate to the instrument and analytical method in accordance with the EPA SW-846 (3rd Edition) methodology and the Laboratory Quality Management Plan (LQMP). All calibrations will be recorded in a calibration log and be available for review and inclusion in the hard copy sample results package. The following paragraphs outline important concerns and provide specific information regarding calibration.

7.2.1 Standard/Reagent Preparation

A critical element in the generation of quality data is the purity/quality and traceability of the standard solutions and reagents used in the analytical operations. To ensure the highest purity possible, all primary reference standards and standard solutions will be obtained from the National Bureau of Standards, the EPA repository, or other reliable commercial sources. All standards and standard solutions are logged into a database that identifies the supplier, lot number, purity/concentration, receipt/preparation date, preparer's name, method of preparation, expiration date, and all other pertinent information.

Standard solutions are validated prior to use. Validation procedures can range from a check for chromatographic purity to verification of the concentration of the standard using a standard prepared at a different time or obtained form a different source. Stock and working standards are checked regularly for signs of deterioration, such as discoloration, formation of precipitates, or change of concentration. Care is exercised in the proper storage and handling of standard solutions, and all containers are labeled as to compound, concentration, solvent, expiration date, and preparation date (initials of preparer/date of preparation). Reagents are examined for purity by subjecting an aliquot or subsample to the corresponding analytical method, as well.

A database is used to store essential information on specific standards or reagents. The system is designed to serve various functions (e.g., the system issues warnings on expiration dates and allows chemists to obtain a list of all working standard solutions prepared from the same stock solution). The program also facilitates the management and auditing of reagents and standards. Stock solutions or working standards indicating any deterioration will be replaced immediately.

7.2.2 Inductively Coupled Argon Plasma (ICP) Emission Spectrometer

Metals analysis typically involves two types of analytical methodology: inductively coupled argon plasma emission spectroscopy (ICP) and atomic absorption spectroscopy (AA).

Each ICP unit is calibrated following the manufacturer's guidelines and the laboratory SOP. The calibration is then verified using standards from an independent source. The linear range of each element is established using a linear range verification check standard. No values are reported above this upper concentration value without dilution.

A calibration curve is established daily by analyzing a minimum of two standards, one of which is a calibration blank. The calibration is verified with the analysis of an initial calibration verification (ICV) standard and an initial calibration blank (ICB). The calibration is monitored throughout the day by analyzing a continuing calibration standard and a continuing calibration blank. If the standard or blank is not within evaluation criteria, the system is recalibrated and all samples since the last acceptable calibration check reanalyzed.

An interelement standard is analyzed at the beginning and at the end of each analytical run (or once every 8 hours whichever is more frequent) to verify that interelement and background correction factors have remained constant. Results outside the evaluation criteria require reanalysis of associated samples.

7.2.3 Atomic Absorption (AA) Spectrometer

In addition to analysis by ICP, metals may be analyzed by atomic absorption spectroscopy (AA) using either graphite furnace atomic absorption spectrometry (GFAA) or cold vapor atomic absorption spectrometry (CVAA). GFAA is used for the analysis of arsenic, lead, selenium and thallium to achieve lower reporting limits than GFAA. CVAA is used for the analysis of mercury.

Each AA unit is calibrated daily prior to analyses being completed. A calibration curve is prepared with a minimum of a calibration blank and three standards. The correlation coefficient of the calibration curve must be greater than 0.995 to be acceptable. The calibration is then verified with a standard (ICV) that has been prepared from an independent source at a concentration near the middle of the calibration curve. A blank standard (ICB) is also analyzed at the beginning of the sample analyses run. The calibration is verified throughout the day with a CCV and CCB. If the continuing calibration standards are outside of evaluation acceptance criteria, the system is recalibrated and all samples analyzed since the last acceptable calibration check standards are reanalyzed.

QA/QC criteria for all metal analyses are followed as listed in the appropriate methodologies found in USEPA SW-846.

7.2.4 Documentation

Documentation of all calibration activities will be maintained by the laboratory and submitted with the data package as requested. The documentation will include standard preparation, calibration curves, calibration verification results, and instrument printouts.

The general laboratory procedures anticipated for the UPRR Omaha Shops CMI are summarized in Table 8.1. Included in the procedures below are general method-specific DQOs and would be applicable whenever a particular method is specified. An analytical data package, including summary pages and raw data, designed to provide sufficient data for CMI decisions, will be received from each laboratory for all samples. The accompanying QC review approach is provided in Section 9 of this DCQAP. Specific laboratory practices for the methods listed below, including sample preparation, sample tracking, and documentation controls, are provided in the LQMP located in Appendix B of this DCQAP.

8.1 METALS

The metals analyzed for the UPRR Omaha Shops CMI will be the eight RCRA metals, which include: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Interpretation of metals data can be complex, particularly when background and/or naturally occurring levels complicate the analysis.

The methodologies for the metals analyses are listed in Table 8-1. The following are various factors which influence the use of particular methods:

- Detection Limits
- Interference
- Stability
- Project-specific DQOs

Most metals, with a few exceptions, are detected at levels appropriate for UPRR Omaha Shops DQOs utilizing inductively coupled plasma emission spectroscopy (ICP). Method 6010B (SW-846) is the method of choice for water and soil analyses (with appropriate digestion methods). Graphite furnace atomic absorption (GFAA) methods will be used for arsenic, lead, selenium and thallium. Cold vapor atomic absorption (CVAA) methodology will be utilized for the analysis of mercury. The required reporting limits for metals are summarized in Table 8-2.

TABLE 8-1

ANALYTICAL PROCEDURES FOR SOIL ANALYSES
UPRR OMAHA SHOPS CMI

Parameter	Technique	Matrix	Sample Preparation Method	Analysis Method [1]
Metals	ICP	Soils	3051 – soils	6010B
Metals	GFAA	Soils	3051 – soils	7060 (Arsenic) 7740 (Selenium)
Metals, Mercury	CVAA	Soils	7471	7471

CVAA = Cold Vapor Atomic Absorption
GFAA = Graphite Furnace Atomic Absorption

[1] Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition, Final Update IIB.

TABLE 8-2

REPORTING LIMITS FOR METALS
UPRR OMAHA SHOPS CMI

Analyte	Soil Reporting Limit	Units
Arsenic	1	mg/kg
Barium	1	mg/kg
Cadmium	1	mg/kg
Chromium	1	mg/kg
Lead	0.3	mg/kg
Mercury[1]	0.2	mg/kg
Selenium	0.5	mg/kg
Silver	1	mg/kg

Notes:

[1] CVAA = Cold Vapor Atomic Absorption Technique, Method 7471

Metals analyzed by GFAA include arsenic (7060), lead (7421), selenium (7740), thallium (7841), and mercury (7471)

9.1 ANALYTICAL LABORATORY DATA REVIEW AND REPORTING

The specific requirements for the laboratory data deliverables are specified in the laboratory service contracts. The analytical data generated by the laboratory will be checked for accuracy and completeness. The data review for this project will consist of data generation, reduction, and two levels of review as summarized below.

The first level of review, which may contain many sublevels, will be conducted by the analytical laboratory. All data are generated and reduced following protocols specified in the LQMP. The Laboratory Quality Assurance Manager or designee will evaluate the quality of the data based on an established set of laboratory guidelines. The laboratory will review the data package to ensure:

- Sample preparation information is correct and complete
- Analysis information is accurate and complete
- The appropriate SOPs have been followed
- Analytical results are correct and complete
- QC samples are within established control limits
- Analytical requirements have been met
- Documentation is complete

This first level of review will be completed under the direction of the laboratory QA manager.

The laboratory will prepare and retain full analytical and QC documentation. Such retained documentation can be hard copy (paper), but must also be on another storage media (i.e., magnetic tape). As needed, the laboratory will supply hard copy of the retained information. Copies of the raw data will accompany the data package.

The contents of each sample delivery group (SDG) should include general information and method-specific information. The SDG data package should be comprised of three parts. The first part is a summary of the analytical sample results. The second part consists of a summary of QC samples sufficient to complete the data review. The third part of the data package consists of electronic deliverable. The electronic review will also include verification of the electronic data versus the hard copy raw data.

The hard copy deliverable data package will consist of the following items:

- Chain-of-custody
- Cooler receipt forms
- Complete list of samples in the SDG including QC samples including lab identification number and URS field identification number
- SDG case narrative describing in detail any problems encountered in sample analyses or a statement that QC criteria were met and no problems were encountered

- Sample preparation log and batch log sheets
- Blank data including quantitation reports
- Surrogate spike compound data including quantitation report
- Matrix spike/matrix spike duplicate data including quantitation report
- Laboratory control samples including quantitation report
- Sample data including quantitative reports
- Instrument analysis run logs

Each sample report form should include the sample I.D., analytical result, an analyte reporting limit, surrogate recoveries (where applicable), and any data qualifiers.

The data package will be signed by an authorized laboratory employee signifying data review was completed.

9.2 DATA REVIEW

The second level of review will be completed by the URS project chemist whose function is to provide an independent review of the data package. The review is conducted to ensure that:

- Data provided in the laboratory deliverable are scientifically sound, appropriate to the method and completely documented
- QC samples are within established guidelines
- The data is ready for use to make site-specific decisions
- The data package is complete

All data generated for the UPRR Omaha Shops CMI will be reviewed following guidance presented in National Functional Guidelines for Organic Data Review, 1994 (where applicable to selected methodologies) and using QC criteria as defined in this DCQAP. The data review includes a review of the following data package items:

- Laboratory case narratives
- Holding times
- Chains-of-custody
- Method blanks
- Surrogate compounds
- Laboratory control samples (LCS)
- Matrix spike/matrix spike duplicate (MS/MSD)
- Field and laboratory duplicates
- Reporting limits

QC data will be compared to evaluation criteria as defined in the EPA methodologies. QC parameters outside evaluation criteria will be qualified as required by the guidelines. The

reviewer will identify any out-of-control data or data omissions and interact with the laboratory to correct data deficiencies. Decisions to repeat sample collection and analysis may be made by the Project Chemist, based on the extent of deficiencies and their importance in the overall project and the decisions to be made with the data. The data review by the project chemist will be documented in the form of a Data Review Report, including the name of the reviewer and the date completed.

To ensure that all analytical data generated for this project are reliable, all equipment and instruments will have a prescribed routine maintenance schedule in addition to a calibration schedule. Preventive maintenance will be completed and documented by qualified project personnel.

10.1 FIELD INSTRUMENTS

All field instrumentation, sampling equipment, and accessories will be maintained in accordance with the manufacturer's recommendations and specifications in addition to established field practices. All maintenance will be performed by qualified project personnel and will be documented in the appropriate field logbooks.

The Field Manager will review calibration and maintenance records on a regular basis to ensure that the required maintenance is occurring. The review will be documented in a field logbook. Field instruments will be calibrated, and the calibration verified each day prior to use on site. Batteries will be charged and checked daily where applicable. Field instruments will be replaced if in need of additional maintenance or repair.

10.2 LABORATORY INSTRUMENTS

The laboratory is responsible for the maintenance of its laboratory equipment. Preventative maintenance will be provided on a scheduled basis to minimize down time and the potential interruption of analytical work. All instruments will be maintained in accordance with manufacturer's recommendations and normal approved laboratory practice.

Designated laboratory personnel will be trained in routine maintenance procedures for all major instrumentation. The laboratory shall designate a supervisory-level person to be responsible for oversight of the laboratory instruments used for this project. When repairs become necessary, they will be performed by either trained staff, or trained engineers/technicians employed by the instrument manufacturer. The laboratory will have multiple instruments, which will serve as backup to minimize the potential down time. All maintenance will be documented and kept in permanent logbooks. The logbooks will be available for review by auditing personnel.

Both scheduled and unscheduled maintenance required by operational failures will be recorded in the logbook. The designated laboratory operation coordinator will review maintenance records on a regular basis to ensure that required maintenance is occurring. The review of the maintenance records will be documented in the logbooks.

10.3 FIELD SUPPLIES AND CONSUMABLES

The Field Manager is responsible for ensuring that all consumable materials and ancillary sampling equipment is adequate for its intended use, compatible with other equipment, and free of defects. An informal inspection of all field supplies should be done periodically and recorded in the field logbook.

The ultimate responsibility for maintaining quality throughout the UPRR Omaha Shops CMI rests with the URS Project Engineer. The routine operation of the quality assurance falls upon the Field Manager, the Project Chemist, the Project QA Officer, and the subcontractors' program administrators.

Any and all nonconformances with the established quality control procedures will be expeditiously identified and controlled. No additional work, which is dependent on the nonconforming activity, will be performed until the identified nonconformance is corrected.

11.1 FIELD CORRECTIVE ACTION

The Field Manager will review the procedures being implemented in the field for consistency with the established protocols. Sample collection, preservation, and labeling, etc., will be checked for completeness. Where procedures are not strictly in compliance with the established protocol, the deviation will be documented in field logbooks and reported to the QA Officer. Corrective actions will be defined by the Project Chemist and Project Manager and documented as appropriate. Upon implementation of the corrective action, the Project Chemist will provide the QA Officer with a written memorandum documenting field implementation. The memorandum will be forwarded to the Project Coordinator and become part of the UPRR Omaha Shops CMI project file.

11.2 LABORATORY CORRECTIVE ACTION

The laboratory department supervisors will review the data generated to ensure that all quality control samples have been run as specified in the appropriate methodologies. The results of the QC samples will be compared to established criteria for completeness, accuracy, and precision. Data generated with QC samples that do not meet the evaluation criteria are considered suspect and the analysis repeated; the results will be reported with qualifiers if reanalysis is not possible.

Laboratory personnel will suspect that corrective actions are necessary if:

- QC data are outside the warning or acceptable windows for precision and accuracy
- Blanks contain contaminants above the levels specified in the laboratory QA/QC Manual
- There is an unusual trend of low matrix spike recoveries or high RPD between matrix spike duplicates
- There are unusual changes in the detection limits
- There are any unusual recoveries of the laboratory QA/QC samples

If any nonconformances in analytical methodology, quality control samples, etc., are identified by the bench analyst, corrective actions will be implemented immediately. Corrective actions procedures will be handled initially at the bench level by the analyst who will review the preparation or extraction procedure for possible errors, check the instrument calibration, spike and calibration mixtures, instrument sensitivity, etc. The analyst will then immediately notify his/her supervisor as to the problem that is identified and the investigation, which is being

conducted. If the problem persists and cannot be identified, the matter will be referred to the laboratory supervisor and laboratory QA Officer for further investigation. Once the problem is resolved, full documentation of the corrective action procedure is filed with the laboratory QA Officer and the URS QA Officer. The corrective action memorandum will be forwarded to the Project Coordinator for inclusion in the UPRR Omaha Shops CMI project file.

Corrective action may include, but is not limited to:

- Re-extracting and reanalyzing suspect samples
- Resampling and reanalyzing samples
- Evaluating and amending sampling and/or analytical procedures
- Accepting data with an acknowledged level of uncertainty
- Recalibrating instrumentation and reanalyzing the suspect samples

Data deemed unacceptable following the implementation of the required corrective action measure will not be accepted by the Project Manager, and follow-up corrective actions will be implemented. Laboratory corrective action details are provided in the LQMP located in the project file.

The Field Manager will report to the Project Manager on a daily basis regarding progress of the fieldwork and quality control issues associated with field activities. The laboratory maintains detailed procedures for laboratory recordkeeping, including performance audit samples reports and corrective action reports in order to support the validity of all analytical work. Each data set report submitted to the Project Chemist will contain the laboratory's written certification that the requested analytical methods were run and that all QA/QC checks were within established control limits for all samples analyzed.

All corrective actions taken on the project will be documented by memorandum and forwarded to the Project Coordinator for inclusion in the UPRR Omaha Shops CMI project file.

Performance and system audits may be conducted to verify documentation and implementation of the QA program, assess the effectiveness of the UPRR Omaha Shops CMI WP, identify any nonconformances, and verify corrective action of identified deficiencies.

13.1 PERFORMANCE AUDITS

Performance audits of the laboratory participating in the UPRR Omaha Shops CMI are performed in accordance with the procedures and frequencies established for SW-846 methodologies by the USEPA.

The QA Officer will evaluate the need for additional performance audits with due consideration given to the recommendations of the Project Manager. Performance audits are used to quantitatively assess the accuracy of measurement data through the use of performance evaluation and blind check samples. The performance audit, if needed, will be performed by the QA Officer or his/her designee in accordance with documented procedures.

13.2 SYSTEM AUDITS

A system audit of the fieldwork performance may be conducted by the QA Officer during the UPRR Omaha Shops CMI. The Field Manager is responsible for supervising and checking that samples are collected and handled in accordance with the approved project plans and that documentation of work is adequate and complete. The Project Manager is responsible for overseeing that the project performance satisfies the QA/QC objectives set forth in the WP. Reports and technical correspondence will be peer reviewed by an assigned qualified individual, otherwise external to the project, before being finalized.

13.3 AUDIT RECORDS

If an audit is completed, the original records generated for all audits will be retained within the central project files. Records will include audit reports, written replies, the record of completion of corrective actions, and documents associated with the conduct of audits, which support audit findings and corrective actions as appropriate.

13.4 OVERALL DATA ASSESSMENT

Existing data and new data collected during the CMI will be assessed for completeness, continuity, and reasonableness.

Test Methods for Evaluation Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition, Final Update IIB

United States Environmental Protection Agency Publication 600/2-85/104, Practical Guide for Groundwater Sampling

United States Environmental Protection Agency Publication 600/4-79/020, Methods for Chemical Analysis of Water and Wastes, March 1983.

United States Environmental Protection Agency Publication 600/R-93/116, Method for the Determination of Asbestos in Bulk Building Materials, July 1993

United States Environmental Protection Agency Publication 600/R-98/018, EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5, February 1998.

United States Environmental Protection Agency, EPA Requirements for Quality Assurance Project Plans (QA/R-5), October 1998.

DRAFT

CMI PROJECT MANAGEMENT PLAN OPERABLE UNIT NO. 1 (OU1)

Omaha Shops

Prepared for
Union Pacific Railroad Company
Omaha, Nebraska

UNION PACIFIC

ENVIRONMENTAL MANAGEMENT

July 2000

URS
101 South 108th Avenue
Omaha, Nebraska 68154

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Acronyms

AOC	Area of Concern
CFR	Code of Federal Regulations
CMS	Corrective Measures Study
CQA/QCP	Construction Quality Assurance/Quality Control Plan
DCQAP	Data Collection Quality Assurance Plan
DMP	Data Management Plan
EA	Environmental Assessment
HDR	HDR Engineering, Inc.
HSP	Health and Safety Plan
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram (parts per million)
msl	Mean Sea Level
Order	Administrative Order on Consent
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PMP	Project Management Plan
ppm	parts per million
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
SA	Site Assessment
SWMU	Solid Waste Management Unit
UPRR	Union Pacific Railroad Company
URSGWC	URS Greiner Woodward Clyde
URS	URS Corporation
USEPA	U.S. Environmental Protection Agency
W-C	Woodward-Clyde Consultants

The Union Pacific Railroad Company (UPRR) Omaha Shops are the subject of a United States Environmental Protection Agency (USEPA) Order on Consent (Order) under Section 3008(h) of the Resource Conservation and Recovery Act (RCRA). The Order requires UPRR to complete a Corrective Measure Implementation (CMI) Work Plan at Operable Unit No. 1 (OU1) within the Omaha Shops. This Project Management Plan (PMP) is one component of the CMI Work Plan. This PMP describes existing information, technical approach, schedules, budget, project team, and overall management approach for completion of the CMI Work Plan.

1.1 OBJECTIVE

The primary objective of the CMI at the Omaha Shops OU1 site is to reduce the potential for current occupants, future construction workers, and recreational users to be exposed to lead-contaminated soils. Sufficient data will be collected to achieve the performance standards in accordance with the Order requirements.

Work for the CMI will consist of the excavation and on-site disposal of the top 12 inches of soil contaminated with lead above 1,218 mg/kg, and the collection of field data, including soil and air samples. Chemical and other pertinent data will be evaluated as they are generated to guide subsequent construction phases at the site.

1.2 SITE LOCATION AND GEOGRAPHICAL SETTING

The Omaha Shops are located at 9th and Webster Streets in Omaha, Nebraska (North 41 15'58" latitude, West 95 55'40" longitude). The legal description of the facility is Township 15 North, Range 13 East, Section 22, Douglas County, Nebraska. The Omaha Shops encompass approximately 184 acres located just west of the Missouri River in an industrialized area of downtown Omaha (Figure 1-1). OU1 consists of approximately 120 acres of the Omaha Shops property (Figure 1-2).

Land use surrounding the Omaha Shops is predominantly industrial. Neighboring businesses include the Omaha Dock, William Brothers, ASARCO, Nebraska Machinery, Caterpillar, Air Products, Air Lite Plastics, UPRR Research and development Laboratory, Aaron Ferer Scrap Metal, and Cargill.

The topography of the Omaha Shops is typical of the Missouri River floodplain. The land surface is nearly level. Surface drainage is primarily to the east, toward the Missouri River. Surface elevation of the site is approximately 985 feet above mean sea level (msl). The Omaha Shops are about 10 to 15 feet above normal river stage.

1.3 PROPERTY OWNERSHIP AND SITE HISTORY

The Omaha Shops include various buildings and production support areas, each having a function in past operations of the facility. The Omaha Shops were in operation for approximately 100 years, with principal functions as a railroad fueling facility, repair shop, paint shop, and car body repair shop for UPRR's locomotive and car fleet.

UPRR used steam engines from the 1860's until the mid-1950's. The original steam engines were fueled by burning wood, coal, oil, fuel oil, and petroleum-based fuel. In the mid-1950's, diesel power became the predominant source of power for train locomotives. During that time, the entire facility was converted from handling steam engines to diesel engines.

From the 1950s to 1988, the site was a major overhaul and maintenance facility for UPRR. In 1988, most of the operations, except the Print Shop and the Car Shop, moved to Little Rock, Arkansas. After the operations were moved in 1988, facility demolition began.

1.4 SUMMARY OF CURRENT CONDITIONS

1.4.1 Site Geology

Regionally, the Omaha area is part of the Great Plains physiographic province. The upland is covered with alluvium deposits of Peoria Loess and younger loess. The loess is underlain by deposits of glacial till of various ages. Bedrock, underlying the glacial till, crops out at a few locations in steep or broken areas at stream or river borders (UPRR 1984).

The Omaha Shops were originally constructed within the Missouri River floodplain. The site was prone to periodic flooding prior to 1952, when the U.S. Army Corps or Engineers built a levee and floodwall along the river, which currently protects the Omaha Shops from flooding.

Shallow unconsolidated deposits at the site are characterized by fill and alluvium. Previous investigation at and near the site indicates that fill ranges in thickness from 1 to 9 feet, with the thickest fill near the river channel. The fill consist of cinders, bricks, glass, metal, and gravel in a matrix of silt (URSGWC 1999). Alluvial deposits consisting of interbedded clay, silt, sand, and gravel underlie the fill. The alluvial sequence lies above bedrock, which is about 20 to 50 feet below ground surface (UPRR 1984).

Bedrock is of Pennsylvanian age and consists of alternating beds of limestone and shale. Three different formations are normally encountered in this location; the Wyandotte Limestone, the Lane Shale, and the Iola Limestone. These formations are of the Kansas City Group of the Missouri Series (UPRR 1984).

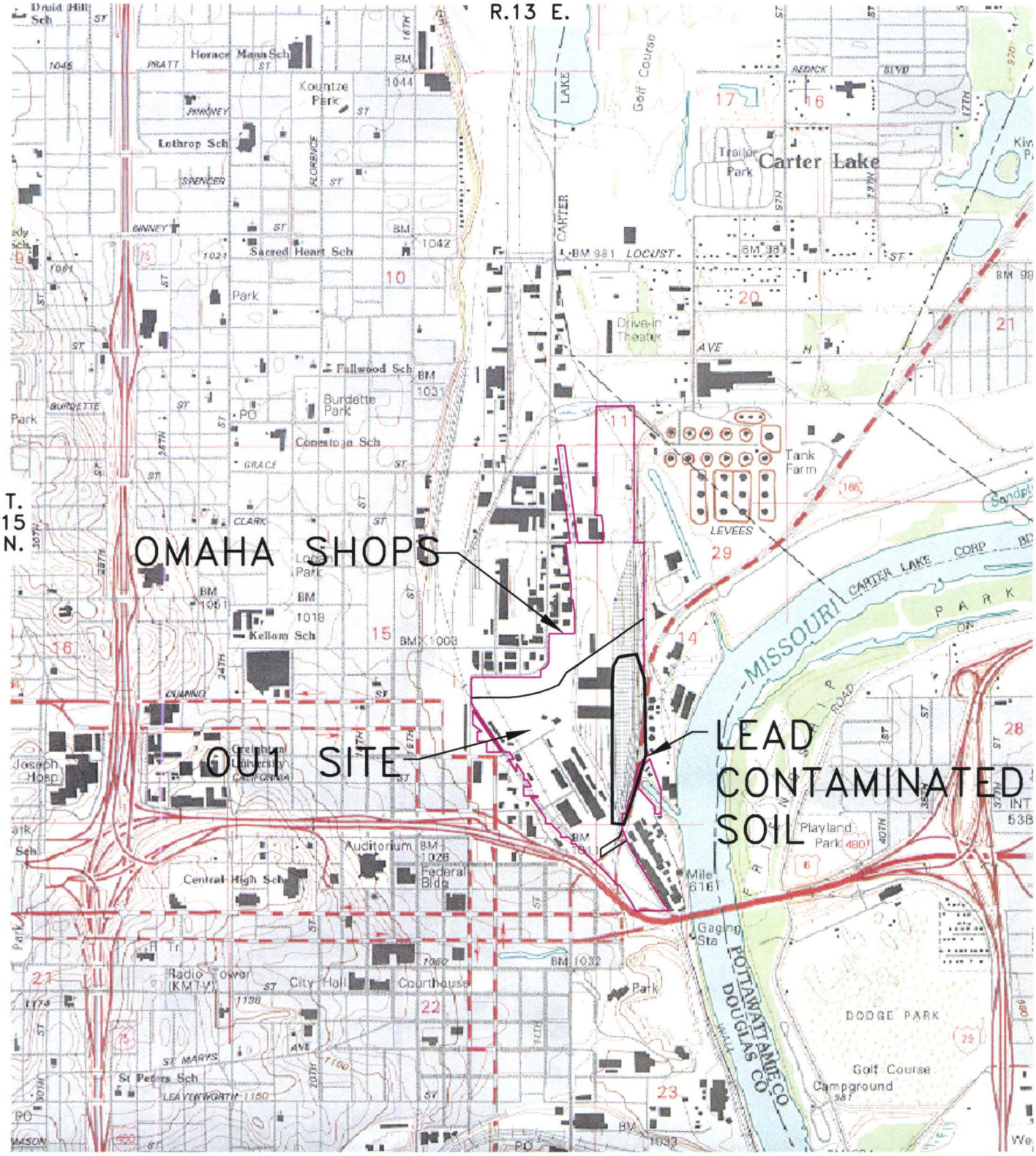
1.4.2 Site Hydrogeology

Shallow groundwater is encountered at the site at depths ranging from approximately 3 to 15 feet bgs (W-C 1995). Groundwater appears to flow easterly, with a calculated hydraulic gradient in the direction of flow estimated at 0.01 feet per foot (HDR 1990). The alluvial sediments are expected to have a low hydraulic conductivity with a range of 0.3 to 0.003 feet per day. Hydraulic recharge is likely from surface infiltration due to the porous characteristics of the surface fill materials (UPRR 1984).

1.5 CMI WORK PLAN DOCUMENTS

The CMI Work Plan, as specified in the Order, requires the following planning documents for work activities to be completed at OU1.

- Project Management Plan (PMP)
- Data Management Plan (DMP)
- Construction Quality Assurance/Quality Control Plan (CQA/QCP)
- Health and Safety Plan (HSP)
- Data Collection Quality Assurance Plan (DCQAP)



NEBRASKA

QUADRANGLE LOCATION

BASE MAP SOURCE: USGS 7.5 MINUTE SERIES (TOPOGRAPHIC) QUADRANGLE MAP OF OMAHA NORTH, NE.-IA., 1994.

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OMAHA SHOPS LOCATION

UNION PACIFIC

OMAHA SHOPS
UNION PACIFIC RAILROAD COMPANY

URS Greiner Woodward Clyde

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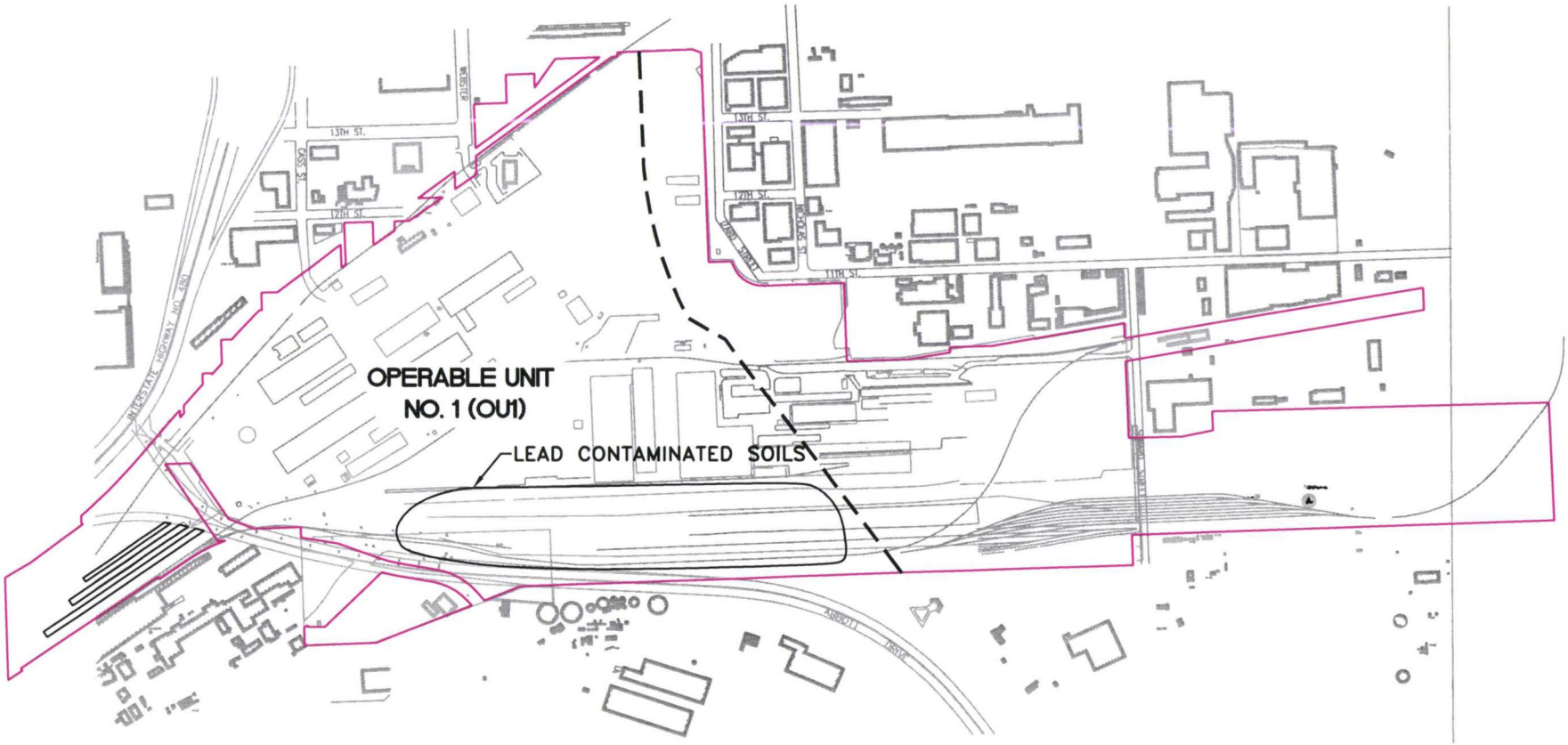

LEGEND

UPRR OMAHA SHOPS PROPERTY LINE

OU1 SITE AREA BOUNDARY

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OPERABLE UNIT 1

OMAHA SHOPS
UNION PACIFIC RAILROAD COMPANY

URS Greiner Woodward Clyde

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2.1 MANAGEMENT APPROACH

The management approach for this project is designed to assign clear responsibilities for various project functions and to establish appropriate lines of communication to facilitate efficient completion of the project.

2.2 PROJECT ORGANIZATION AND RESPONSIBILITIES

The Omaha Shops are presently owned by UPRR. UPRR is responsible as Project Manager for completion of the CMI as described in the Order. UPRR will also coordinate on-site investigation activities and on-going facility-related work activities to maintain access to work areas.

URS Corporation (URS) is responsible for technical support. URS will be responsible for leading the fieldwork effort, evaluating site data, developing corrective measures, and preparing reports.

URS will contract other work, such as on-site laboratory and land surveying, to qualified firms capable of meeting the project quality assurance/quality control (QA/QC) requirements. URS will work directly with these contractors to coordinate fieldwork.

2.3 PROJECT COMMUNICATION

2.3.1 Regulatory Agencies

All communication with regulatory agencies will be undertaken by UPRR.

2.3.2 Periodic Reporting

Communications and status reports to UPRR will be completed by URS. Status reports summarizing the progress of work, describing problems encountered and corrective measures undertaken, and updating the project schedule will be submitted to USEPA on a quarterly basis by UPRR.

2.3.3 Project Deliverables

Project deliverables, such as the field activity forms, quality control summary reports, and draft and final reports, will be completed by URS. Following internal review by UPRR, project deliverables will be submitted to USEPA.

2.3.4 Meetings

Meetings between the UPRR and USEPA will be scheduled when the parties agree a meeting will be mutually beneficial for communicating project-related plans, data, and evaluations. Possible milestones when meetings may be scheduled include:

- Prior to fieldwork (Kickoff Meeting)
- Upon completion of fieldwork after data are compiled
- Upon completion of USEPA review of draft reports

3.1 PROJECT ORGANIZATION

The organizational structure and responsibilities of key personnel are designed to assure adequate project control and quality for the CMI. Health and safety key personnel and their responsibilities are detailed in the Health and Safety Plan (HSP).

URS will assign a CMI construction manager whose responsibilities will include evaluation and selection of contractors and suppliers, engineering, quality control testing, and other technical field support during construction. UPRR will approve all contractors and suppliers for the CMI construction. The organization chart in Figure 3-1 shows the lines of communication and authority during the CMI construction.

3.2 KEY PERSONNEL

The following key personnel have been identified for the implementation of this CQA/QCP:

- UPRR Project Coordinator (PC): Jeff McDermott
- URS Project Manager (PM): Jeff Smith
- URS Construction Quality Assurance Officer (CQAO): John Heinicke
- URS Site Manager (SM): Chris Poulsen
- Field QC: Staff

3.3 RESPONSIBILITIES AND AUTHORITIES OF KEY PERSONNEL

The responsibilities and authorities of key personnel involved with the CMI are described below.

3.3.1 UPRR Project Coordinator

The UPRR Project Coordinator (PC), or the designated Alternate PC, will oversee all aspects of work required by the Order and will serve as the main point of contact to USEPA and NDEQ. The UPRR PC is responsible for submitting monthly progress reports to the USEPA and NDEQ, and is also responsible for submitting the Construction Completion Report to the USEPA and NDEQ. The UPRR PC maintains approval authority for all contractors and suppliers used to construct the CMI.

3.3.2 URS Project Manager

The URS Project Manager (PM) has the primary responsibility for completing the project so that all work meets quality objectives, budget, and schedule. The PM is the main point of contact between the URS team and UPRR's PC. The PM is responsible for overall coordination within the URS team and assignment of project activities to URS team members.

3.3.3 URS Construction Quality Assurance Officer

The Construction Quality Assurance Officer (CQAO) reports to the URS PM and works directly with the PM and other members of the URS team. The CQAO has the following responsibilities:

- Monitor and verify that work is completed in conformance with this CQA/QCP and other applicable project design, documents, drawings, and specifications
- Assess the effectiveness of the QA/QC program and recommend modifications to the program if deemed applicable
- Verify that QA/QC personnel assigned to the project are trained and indoctrinated relative to the requirements of the QA/QC program
- Review and verify the disposition of nonconformance and corrective measures
- Conduct periodic QA audits

Although the CQAO advises and reports to the URS PM, the CQAO will function independent of the URS PM in implementation of the QA/QC program. The CQAO has the authority to stop work in case of nonconformance with the CQA/QCP or if problems are not corrected in a timely manner.

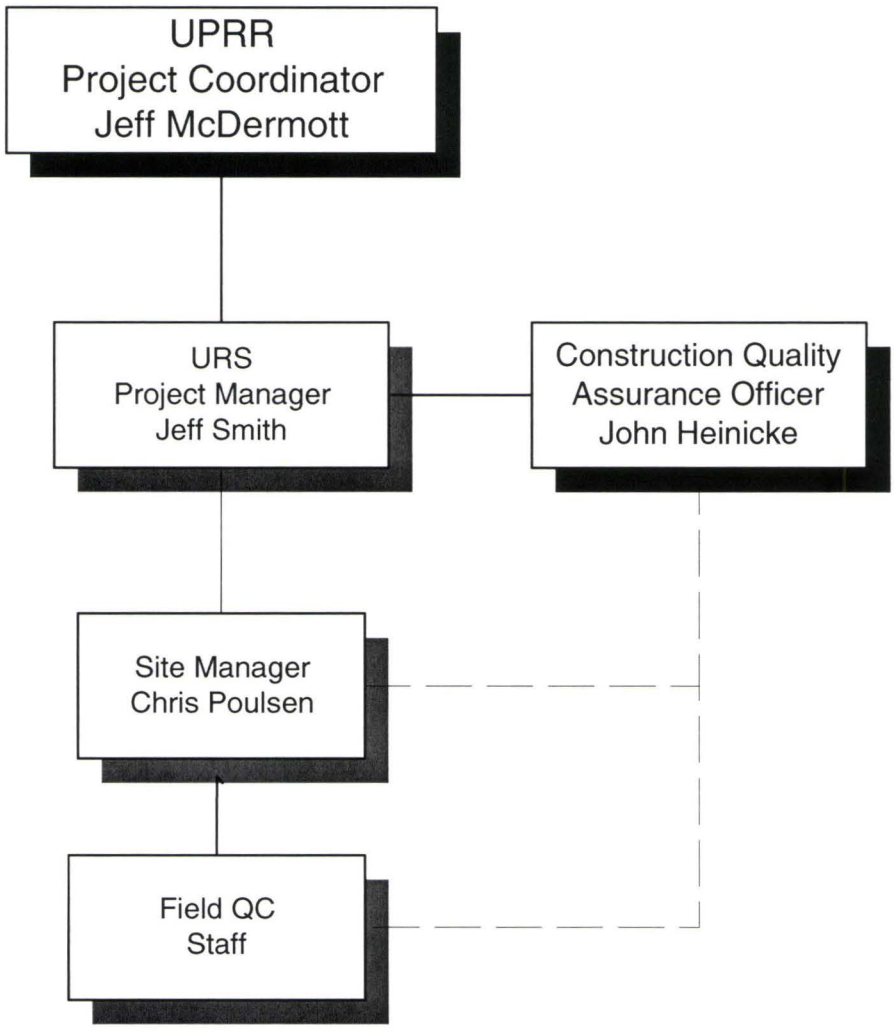
3.3.4 URS Site Manager

The URS Site Manager (SM) reports to the PM and is responsible for assuring that sufficient QC and record data are obtained to prepare the record drawings and Construction Completion Report. The SM has the following responsibilities:

- Monitor daily construction progress, observe and test some work, and complete daily progress reports
- Coordinate on-site QC activities between the QC Field Team and the contractor, and maintain an on-site record of QC activities throughout the construction period
- Communicate proposed modifications of the approved design documents to the PM, coordinate approved modifications with the contractor, and record approved modifications for incorporation into record drawings
- Monitor and assure compliance with construction safety protocols specified in the HSP
- Monitor and assure compliance with the procedures established in the Contingency Plan.
- Oversee the evaluation of contractor and supplier qualifications, including review and approval of contractor and supplier submittals
- Oversee and monitor construction scheduling, cost, and completion of work
- Complete regular site visits during construction
- Review and maintain a record of QC field reports and construction meetings
- Develop record drawings and Construction Completion Report

3.3.5 Field QC Staff

Each member of the field QC staff reports to the URS SM and is responsible for completion of their assigned construction observation, testing, and reporting. Members of the QC staff are responsible for understanding and implementing the provisions of the CQA/QCP as it applies to their individual activities.



ENVIRONMENTAL MANAGEMENT

URS

PROJECT ORGANIZATIONAL CHART
UPRR OMAHA SHOPS - OMAHA, NEBRASKA

DRN. BY: jdg	DATE: 07/24/00	PROJECT NO.	FIG. NO.
CHK'D. BY:	DATE:	45-091MC204.02	3-1

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